DOCTORAL THESIS

Woven walls, threaded horizons: traditional architecture in the modern urban fabric of Papua New Guinea.

Rusch, Rosemarie

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WOVEN WALLS, THREADED HORIZONS:

TRADITIONAL ARCHITECTURE IN THE MODERN URBAN FABRIC OF PAPUA NEW GUINEA

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of the requirements for the degree of
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Dedication

For my father Wolfgang Rusch and in memory of my mother Ramona Rusch

Abstract

This thesis seeks to provide an understanding of housing transformation in light of the social and cultural interface between village and urban settings in Papua New Guinea (PNG). The issue of concern here is based on the premise that there is an intrinsic link between the legacy of traditional architecture and social practice in PNG, which embodies memories, cultural beliefs and behaviours intimately linked to the cultural and physical landscape.

An escalating demand for housing solutions that meet the needs of both urban and rural residents has been highlighted by the impact of human settlement expansion and the resultant development crises, particularly for Oceanic economies. In this study the point of departure is an analysis of housing transformation processes that consider people's own views of housing in villages and the efforts of villagers and urban settlers to provide housing for themselves.

Peoples' need for housing is a basic one which, in PNG, is rooted in village life. It is important, because houses are the artefacts of human interventions, to understand the drivers of traditional village architecture in PNG, with the hope of providing valuable insights into core values of housing that respond to modern lifestyle demands.

Therefore, this thesis calls for a greater understanding of traditional village architecture in Papua New Guinea to appreciate the diversity that is needed to allow individuals to determine their own contemporary housing needs. The value of the past provides a guide for future narratives if the authenticity and integrity of the traditional built environment is respected, at the same time allowing room for the creativity and lifestyle aspirations of these dynamic communities.

Reflecting on architectural transitions in PNG since 1914, this research documents and analyses traditional architecture through two embedded case studies of villages. Using both qualitative and quantitative methods, this research adds to the body of knowledge related to traditional architecture in PNG, which has seen rapid transformation of its built environment in little over 100 years.

Keywords

Architectural heritage, cultural change, housing transformations, Papua New Guinea housing, social change, traditional architecture, Tubusereia, vernacular architecture, villages, Kunguma Western Highlands.

Declaration of Original Authorship

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Doctor of Philosophy (PhD).

This thesis represents my own original work towards this research degree and contains no material that has previously been submitted for a degree or diploma at this university or any other institution, except where due acknowledgement is made.

Signature: _____

Rosemarie Heike Rusch

Date: _____

Ethics Declaration

The research associated with this thesis received ethics approval from the Bond University Human Research Ethics Committee. Ethics application number 15370.

Funding for this research was assisted by Bond University through a Higher Degree Research Scholarship, Professor Craig Langston, Bond University Centre for Comparative Construction Research, and A&L Windows, to whom I am sincerely grateful.

Copyright Declaration

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No published manuscripts were included for publication within this thesis.

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I am indebted to many people. This study would have been poorer without the support, approval, and participation of the people of Papua New Guinea who assisted me in the field and without whom this research would not have taken place.

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Table of Contents

List of Figures

List of Tables

List of Abbreviations

ADB	Asian Development Bank
AHC	Architectural Heritage Centre, Lae Unitech
ANGAU	Australia New Guinea Administrative Unit
ARIA	Accessibility Remoteness Index of Australia
ASGC	Australian Standard Geographical Classification
AusAID	Australian Agency for International Development
DFAT	Department of Foreign Affairs and Trade
JCU	James Cook University
MDG	Millennium Development Goals
NCDC	National Capital Development Commission (of PNG)
NGC	Neu Guinea Compagnie
NGO	Non-government organization
NRI	National Research Unit
PMV	Public Motor Vehicle
PNG	Papua New Guinea
RDI	Remoteness and Dispersion Index
RI	Remoteness Indicator
SDG	Sustainable Development Goals
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNDPAD	United Nations Development Policy and Analysis Division
WHP	Western Highlands Province
WWI	World War One
WWII	World War Two

Word Index[1]

TEMBOKA / MELPA	PISIN	ENGLISH
Bault		Platform (Pronounced Belckch)
Gu	Haus	House
Gu Kumba		Door
Gu Tochma		Bed
Kenckch	Blain	Woven Cladding (Blind)
Kingbulg		Apex of Roof
Kingip		Stone
Koki		Rafter
Aip Kota		Salt (from Charcoal)
Kumei	Pitpit (for weaving)	Miscanthus *floridulus*
Milkaipl		Something to grip together like a necktie
Mui	Pitpit (edible)	Setaria *palmifolia*
Pault		Roof (pronounced pelckch)
Pel		Joists
Punga		Post
Takum		Pandanus trim for walls
Tambiga		Vine for binding (thick)
Tep		Fire
Ungamp	Kunai	Thatching grass (Imperata *cylindrica)*
Unt		Wood
Uwa		Ridge beam
Wieng		Vine for binding (thin, possibly hoya sp.)

MOTU	PISIN	ENGLISH
Au Tadi		Mangrove Wood
Bese		Family Line
Daga Hanai		Ridge beam
Duhu		Post
Guhi		Roof
Haba		Walls
Hadae		Studs
Iduhu		Clan
Itari		Bearers
Kurukuru	Kunai	Thatching grass (Imperata *cylindrica)*
Magani Bada		Barge Board
Ototo		Top Plate
Rohu		Rafter
Sei		Vine for binding (thin)

[1] Spelling is based on how the words sounded to the author in the field. Some pronunciations were difficult to grasp. They are not based on linguistic texts, which is beyond the scope of this research.

Preface

An interest in Papua New Guinea architecture was, for me, inevitable.

In 1965, when I was nine years old, my father moved his expanding family from Germany to live in Kerema, a small settlement in the Gulf of Papua; the freedom was intoxicating. Together my sister Rozana and I roamed the 'bush', sleeping in villages with our friends, exposed to a myriad of new and tantalising visual sensations. Our parish priest, Father Alex Michellod, further piqued my curiosity with his use of bush logs and woven walls to construct mission houses based on the Swiss Chalet designs of his youth. There we enjoyed many a comfortable stay, after travelling by outrigger canoe and tractor to the Mission Station at Araimiri.

Therefore, on my return to PNG for a friend's funeral in 2009, signs of increasing poverty, homelessness, and homogenisation of cultural architectural characteristics were an uncomfortable exposure to the legacy of colonialism and its collision with alternative ideologies.

Papua New Guinea, it seemed to me then, possessed a remarkable traditional architecture of thatched and woven structures, constructed from materials readily available within the village boundaries. My research was therefore an attempt to understand traditional architecture in the contemporary context, to look at how people relate to their homes now, what their lifestyle aspirations are, and whether their homes fulfil these needs.

Increasing urbanisation across the country has implications for traditional architecture where, it seems, the value of tradition has rarely been acknowledged, nor intrinsic elements suited to the natural environment retained.

Michellod Log Cabin and Church, Kosipe, PNG ca.1970s.
With permission: Hope (2009b). No nails were used in the construction of these buildings.

Chapter 1: Introduction

> *Homes are special places in one's life. Even with the separation of physical distances, it is refreshing and sustaining to be able to be spiritually, emotionally and affectionately attached to one's home. The attachment to home brings reassurance and warmth and living hope and energy in times of despair and hopelessness. The sentiment attached to home is such that, even when the house is no longer standing, it is fresh in one's memory as if it was yesterday, and as if everything had never changed. (Gonduan 2000: 51)*

1.0 INTRODUCTION

An escalating demand for housing solutions that meet the needs of both urban and rural residents has been highlighted by the impact of human settlement expansion on overpopulation and the resultant development crises, particularly for economies in Oceania. Importantly, many more recent reports about Papua New Guinea[2] have focused on development agendas, basic human rights, urban poverty, urbanisation, and infrastructure (Oram 1976; Stretton 1979; 1984; Goddard 2001; Connell 2011; Lavu 2012; Maddocks 2012), yet limited research has extended specifically to housing, with some notable exceptions being Week (1982); Loupis (1984); Karo (1988); (Costigan 1995); Gonduan (2000).

1.1 GENERAL CONTEXT AND OVERVIEW

Jones (2016: xv)[3] suggests it is necessary to rethink the approach to the myriad forms of settlements and villages in the wider urban context, and to ask, *'who really builds Pacific towns and cities, what processes are used, and how can they be best supported and managed in a more equitable manner?'* Informal and squatter settlements lie at the heart of Jones' concern,

[2] The contemporary Australian spelling of 'Papua New Guinea' is used here, to cover the various designations applied to the British, German and Australian colonial possessions from 1884 to Independence in 1975. The spelling within PNG since Independence is Papua Niugini.

[3] Professor Paul Jones (PhD, UQ; MURP, UNE; Masters (Development Geography), Sydney; Postgraduate Diploma in Urban Studies, Macquarie; BA (Economic Geography), Macquarie. Associate Professor, Director, Master of Urban and Regional Planning) has spent the last 20 years specialising in urban management and urban development projects in the Pacific Region. This has included working in Papua New Guinea, Kiribati, Samoa, Fiji Islands, Vanuatu, New Caledonia, Marshall Islands, as well as Philippines, China, Israel and Thailand. Professor Jones' experience has focused on better managing human settlements. Key professional highlights include leading the team for the preparation of the first National Urbanisation Policy for PNG, 2010-2030 (2009 - 2010).

yet he acknowledges the social connection between migrants and their villages of origin. It was consideration of these connections that led to the selection of two Papua New Guinea (PNG) villages, Kunguma in the Western Highlands Province and Tubusereia in Central Province, as case studies on which to base this research (see Section 1.6).

Migration patterns in PNG are complex and diverse, dependent on key differences in land tenure arrangements that challenge the colonial legacy of formal government urban planning systems, which have typically been top-down processes. Settlements, by contrast, operate on bottom-up social and organisational structures outside the bounds of formal planning regulations. Jones (2016) conceptualises the notion of village[4] cities, where kin, tradition and village values dominate, drawn from an extensive geographic network, with wide disparities in levels of housing provision compared with the formal sector.

> *Throughout Melanesia, the village is the most important social and political unit. In some places a village is a physically located geographic entity which shares a common history, a common territorial boundary, a group of people who have common bonds and a system of government. One village recognises another village as a free, and independent political body. In other places the people of a common unit might not be physically located together in a compound but are united in their outlook, by their common history, experience, or kinship, and thus constitute a social and political unit (Narokobi 1983: 111-12).*

Tradition is among the most widely used terms in literature about culture and society but attempts to elucidate what tradition means is either an assumed or contested description in the social and cultural sciences, as well as in the built environment. For Shils (1971: 126) traditions are beliefs with a particular social structure linked to a sequential time span through transmission with authoritative attachments to the past. Shils' view leaves open the possibility of new patterns of innovation, even fundamental change in which the past persists.

[4] The term *'village'* is used throughout, as generally accepted in conversation and text, while acknowledging that it is a term of convenience originally applied by Western colonialists to describe the wide variety of settled conditions that existed, and still exist in PNG.

Rowley (1972: 14), accepting that village is a term for Western convenience, describes villages in PNG as conjugal families joined with others in a community which maintains itself on the produce of its own lands and waters. They may be hamlets of two or three houses, or up to 1000 inhabitants for a very large one, linked by kinship and tradition to others living similarly and with whom they gather for special ceremonies.

Busse (2009: 358) describes tradition as a general process of something being handed down from one generation to the next but included in this process is an expectation of respect and duty. The problem is in being able to define what aspects are worthy of respect.

Tilley (2006) on the other hand presents tradition as a representation of social identity that is governed by the past while at the same time carrying these experiences into the present. Nevertheless, he suggests that in the post-traditional society that contemporary modernity has thrust upon us, people may turn to notions of collective traditions and shared material forms (whether remembered or imagined) to produce a semblance of continuity.

Value also needs to be put into context, for it too is a contested term. Graeber (2001) suggests three streams of thought, all equally valid to this research and architecture generally:

> *"values" in the sociological sense: conceptions of what is ultimately good, proper, or desirable in human life*
> *"value" in the economic sense: the degree to which objects are desired, particularly, as measured by how much others are willing to give up to get them*
> *"value" in the linguistic sense, […] and might be most simply glossed as "meaningful difference" Graeber (2001: 1-2).*

The transition from pre-colonial to post-Independence settlement has, arguably, contributed to the debate on what constitutes value in terms of housing in PNG, where the physical pattern of dispersed settlements of homogeneous clans, tribes and ethnic groups has broken boundaries and expanded to new peri-urban village like settlements of heterogeneous mixed kin and non-kin residents. Claims to occupation, ownership and use of land are disputed, leading to a proliferation of squatter and informal settlements (Jones 2016).

The term *'squatter settlement'* in PNG generally refers to the illegal occupation of state land, whereas *'informal settlements'* are defined by arrangements negotiated with customary land owners, and may be indistinguishable spatially from traditional villages, which together have become the dominant urban form (Jones 2012c). Most PNG settlements are a result of cultural permeation on the fringes of cities outside government jurisdiction, and have developed organically as ethnic enclaves, retaining many characteristics of their rural villages of origin.

When discussing the transition to Independence, Rowley (1972) stated that no general description can do justice to the many differences in systems of belief, economic activity and

social organisation that exists in PNG, and that '*even when they live in towns, most [people] retain their village-conditioned attitudes*' (Rowley 1972: 8).

Composed of migrants from other parts of the country, settlements represent a diversity of cultures and language groups, with house construction based on traditional values. Nevertheless, rapid expansion, socio-economic factors and overcrowding suggest the disappearance of architectural cultural distinctiveness. Moreover, Busse (2009: 359) proposes that after PNG Independence, politicians and bureaucrats saw culture ad a commodity for the tourism market and not as a way of life linked to people and the places in which they lived. In this respect it is important to consider what people understand to be a traditional home and whether these homes meet their contemporary needs.

Christopher Alexander and the future environmentalists of the Oregon Experiment, found that form and function do not absolutely follow one another; that 'organic' architecture had prevailed for thousands of years with a combination of tacit, culture-defined approaches to well-known problems, which nevertheless left room for an underlying order. Alexander et al. (1975: 12) warned that if traditions vanish along with cultural norms, a chaos of random development occurs, followed by the imposition of rigid planning regulations which cause rifts between users and their environment. On the other hand, an organic process can, with minor modifications, be adopted by any community, anywhere in the world. Nonetheless, it is acknowledged that this could only work where the concept of private property has been abolished (Alexander et al. 1975) or, as in the case of PNG, never existed prior to colonisation (Burton 2007; Filer 2007).

Conversely, Aldo Rossi, while equally concerned with culture, nevertheless posits that form and function need to remain interrelated to remain relevant. The house materially represents a peoples' way of life, and the typological form that characterises it is a manifestation of culture based on collective memory (Rossi 1982). Therefore, transformation embodies both the material structure and memories of a former type where *'Form [the soul of the city] becomes the sign of a place. Memory becomes the guide to its structure'* (Rossi 1982: 7).

Similarly, Cesar Pelli proposed that individual buildings are parts of the whole composition of our cities and making buildings which resonate within that locus has been a continuing goal of architecture throughout the ages. He advanced the idea that it is important not to allow technological and cultural changes to weaken the relationship between buildings, the cities they form and their response to the places where they are built, not just the physical site but the cultural, social, political and historical context (Crosbie 2013). Nonetheless, concern

for place and society at large is, arguably, limited in current architectural discourse, particularly that related to housing on the periphery of cities in developing countries.

Rapoport (1977: 17), states that design is a process of elimination based on cultural and physical constraints, but that choices are influenced by the environment and what is learned and communicated from the interaction between individuals and groups. As *Figure 1.1* indicates, a myriad of designs can result from a set of alternatives. Some, however, are not considered, being outliers resulting from cultural and physical environmental constraints, thus narrowing choices to the cluster that best represents a specific community's values.

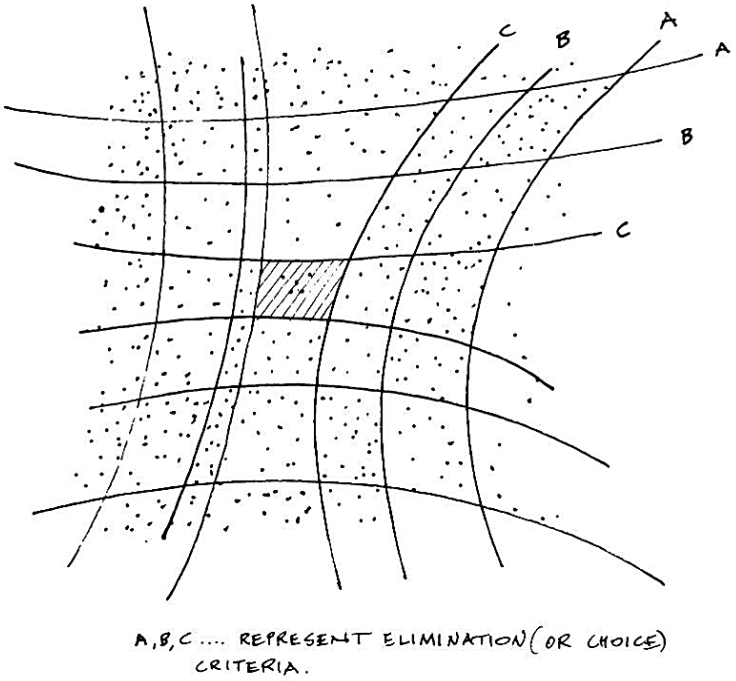

Figure 1.1. Choice Criteria for Design Outcomes.

Source: Rapoport (1977: 17).
Ways that design takes place, stressing the differences in the underlying choice criteria, even for habitat selection (migration). Applying different economic, socio-cultural, psychological, and technological criteria to design, affects the design outcome.

The result of a complex balance between environmental, social and economic factors, in vernacular architecture criteria are often implicit and unstated (Rapoport 1977: 16). Furthermore, a group's adaptive strategies within its ecological setting encourages a particular designed environment based on values, which lead to the constructed norms that broadly distinguish one group from another (Rapoport 1998: 16). This does not explain the variety of built forms in similar ecological settings; even so, it is perhaps these adaptive strategies that complicate establishing a baseline from which to gauge the extent of selective or imposed

change in traditional village housing, particularly when groups or clans form alliances or trading relationships across far ranging regional networks (Warry 1987).

1.2 FOUNDATION FOR THE RESEARCH

> *The concepts of 'the Western' and 'the modern' have been the source of no end of trouble for anthropologists. […] The objections to the concepts are well known: that in most anthropological accounts they serve as a largely implicit foil against which to contrast a 'native point of view'; that much of the philosophical ammunition for the critique of so-called Western or modern thought comes straight out of the Western tradition itself (thus we find such figures as the young Karl Marx, Martin Heidegger and Maurice Merleau-Ponty enlisted in the enterprise of showing how the understandings of North American Indians, New Guinea Highlanders or Australian Aborigines differ from those of 'Euro-Americans'); that once we get to know people well […] not one of them turns out to be a full-blooded Westerner, or even to be particularly modern in their approach to life; and that the Western tradition of thought, closely examined, is as richly various, multivocal, historically changeable and contest-riven as any other (Ingold 2000: 6).*

Evaluation of village and settlement housing tends to be based on social and physical images that are often subjective and at odds with the comparative desires of architects and planners. Residents may well prioritise location, access to kinship structures and support, as well as the economic benefits of informal trade, over and above the physical style[5] of a building. Under 'slum' conditions, physical standards are less important than preservation of support systems and the ability to house a family.

This research thus picks up the common thread that binds urban villages to traditional villages, specifically the complexity of what constitutes house and home in transition, to provide an analysis of housing transformation processes, and the fundamental part played by architecture in cultural identity (Davis 2006). A response to these issues inevitably leads to further debate on the meaning of culture in the PNG built environment, where the ephemeral nature of traditional architecture means that physical examples may no longer exist, and where

[5] 'Style' here is as defined by Rapoport (1977, p.16) '[…] as a system of consistent choices based on the rules and culture of a group (whether tribe or profession). Design can then be seen as a choice *process*, or a process of elimination, from among a set of alternatives (however such alternatives are generated in the first place)'.

historical records reflect a Western[6] outlook that may not provide an authentic voice (Scaglion 2007).

Consequently, it is necessary to define traditional[7] architecture in PNG, to understand how it is used, how it changes with time, function, and cultural constructs, and how these transformation processes influence architectural solutions in villages and village-like settlements. In his research among three East Sepik language groups, Narokobi (1983) determined the meaning of tradition to be "the way of doing something, ever since we can remember" (Narokobi 1983: 79)[8].

> *"There is also a semantic tension between tradition as an active process which may, in some instances, benefit some people at the expense of others and tradition as knowledge and practices that are handed down over generations and therefore worthy of respect. In this sense, then, tradition is a ratifying term" Busse (2009: 358).*

Perspectives on the cultural significance of architecture emphasise an interrelationship between material, social and symbolic aspects, which also encompass the economic and technological influences that effect social change.

An alternative proposition on the historical context of architecture as regeneration has been foregrounded by Strathern and Stewart (2000), who describe the construction of a longhouse shortly after PNG Independence as an experimental moment of innovation and revival for the Wiru people of Pangia. No building of the type had been constructed in the area since 1967. The intention to represent modernity while regaining lost prestige on the part of the

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[6] The term 'Western' used here follows description by Oram (1976) referring to the predominantly Anglo-Saxon industrial culture of northern Europe, the United States and Australia.

[7] The term 'traditional' used here describes vernacular forms that draw on PNG's legacy of village architecture, associated with physical localities and ethnic or tribal groups around which a variety of forms have developed through historical association. For this research, the term 'modern' was used to mean contemporary or in recent times.

[8] Bernard Narokobi (c 1943-2010) was born in Wautogik, East Sepik, the same Mountain Arapesh area where Margaret Mead lived and studied between 1931-1932 (Bablis 2010). He became one of the first Papua New Guineans to graduate in law and in the early 1970s was the only indigenous member of the Constitutional Planning Committee involved in formulating the national constitution prior to Independence.

Narokobi served as Chairman of the Law Reform Commission and the National Cultural Council, and held positions as a lawyer, provincial planner, Professor of Melanesian Philosophy at the University of PNG and Justice of the High Court and Parliamentary Cabinet positions. Through his writings Narokobi is generally considered to be an ideological influencer, making a major contribution to the discussion on PNG identity (Otto 1997).

builder, was said to be an appropriation of culture from the past for the future (Strathern and Stewart 2000: 82) through the ritual action of reconstructing a ceremonial longhouse.

1.3 SCOPE AND RESEARCH QUESTIONS

This thesis proposes that there is an intrinsic link between the legacy of traditional architecture and social practice, and that there are tangible benefits in continuing the use of design and construction methods that harness indigenous tradition yet leave room for the creativity and lifestyle aspirations of dynamic communities.

1.3.1 Research Questions

That architects tend to ignore the past, and the way in which it interlocks with and complements the present, is something that is lacking in architectural discourse (Rykwert 2014), leading to the need to explore the following research questions:

1. What defines traditional architecture in the modern PNG era and how and why has it changed in the places in which it is anchored?

2. Can lessons be learned from the remaining traditional buildings to inform building design and construction that can better serve modern PNG in areas where Western influence and the aspirations that it has generated have largely displaced traditional norms and values?

1.4 RESEARCH AIMS AND OBJECTIVES

The aim of this research is to understand how housing transformation takes place, and the drivers of increased urbanisation in contemporary PNG, from the perspective of the people involved themselves, with specific objectives being:

- To review and analyse the international literature regarding historical transformation of houses in villages and village-like settlements.

- To identify and analyse changes in housing typologies in PNG villages with the objective of recognising patterns of existing and emerging house types.

- To explore stakeholder perceptions of housing modernisation and relate the results of the investigation to development currently taking place in villages and settlements.

- To develop a theoretical contribution to inform policy for architectural solutions that are culturally appropriate, ecologically sustainable, and about more than just shelter and survival.

These objectives address the research questions and are inter-related in attempting to understand the transformation processes and establish a link between traditional architecture, norms and values, founded on existing research about comparative case studies generally.

1.5 SIGNIFICANCE

Current trends in traditional architecture in PNG are important to help understand and explain the complex nature of contemporary housing provision and policy responses required to harness multiple contextual alternatives.

The Huon Seminar (Papua New Guinea University of Technology 1994) stated the intent of sustainable architecture in PNG was to include choice of building materials, ecological and socially sensitive land use, and unity of purpose. Yet there has been little progress in the intervening years, and findings reveal a growing urban divide that needs to be acknowledged and addressed in earnest if we are to stem the continuing source of conflict that the practice of informal urbanisation has become (Connell 2011; Jones 2012b). Land tenure, Connell (2011: 129) posits, determines the pattern and availability of affordable housing in urban areas, while lack of tenure results in poor quality, high-density temporary housing, often leading to degraded environments and few opportunities to consider the needs of inhabitants. The management of customary land has become problematic from legal, social, environmental and economic factors for a people whose livelihood depends on land. The dual land tenure system, which includes Alienated Land Tenure, owned and controlled by the State, and Customary Land Tenure (97% of all land in PNG) held by tribes[9], clans[10] and land groups, where ownership is dictated by local customs and traditional values and beliefs (Karigawa, Babarinde and Holis 2016).

Disputes in relation to land are not limited to urban areas. As Sillitoe (1999) points out, historical tribal attitudes to land in the Southern Highlands, for example, prevail. Where land use

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[9] Tribe: In relation to PNG Read (1954: 39) describes tribes as a political group combining as far as possible for attack or for the defence of its settlements. It is the largest group within which warfare is forbidden and where members speak of themselves as ‘one kind’ or ‘one people’, including a combination of two principle sub-clans.

[10] Belshaw (1957) distinguishes a ‘clan’ as people claiming common descent, whereas an ‘iduhu’ is a residential unit of patrilineal decent, in other words a sub-group of the main line.

Clarke (1971: 12, 26) suggests that clan is a term that refers to a groups’ attachment to place. Though patrilineal descent is the ideological basis, a more trustworthy standard is residence within on territory. Kinship therefore is a condition that provides the right to use community land and access to the distribution of resources.

Feachem (1973: xxv) refers to a clan as a named, exogamous, localised, patrilineal descent group. It is a segment of a phratry and is composed of sub-clans and patrilineages.

provides for identity and community continuity, it does not extend to individual ownership or disposal rights. Thus, while exact boundaries may be indistinct, '*continuity of possession depends on narrative history*' (Sillitoe 1999: 340).

Similar practices are noted in studies of other PNG cultural areas (Hogbin and Lawrence 1967; Burton 2007; Filer 2007), making it difficult to provide for housing choices outside village-like constraints. Although people can own land individually in PNG, '*the legislative response to land matters […] places an unequally heavy emphasis on the collective ownership of land*' (Burton 2007: 195).

Reinforcing the notion that the past influences the present (Shils 1971; Rossi 1982; Davis 2006; Diamond 2012; Denham 2018), and furthermore that village architectural traditions are subtly interwoven in urban village cities, this research concentrates on housing at the village level, to understand and explain the uptake or abandonment of traditional architecture in the modern urban fabric of PNG, and the tenuous threads that link it to future development horizons.

Accordingly, investigating whether architectural tradition can be a prime driver for design and construction in the wider community and village cities, may be timely if PNG is to better manage the first indicator of Sustainable Development Goal 11 (SDG) (United Nations 2018: 24), to make cities and human settlements inclusive, safe, resilient and sustainable, the first target of which is *'to ensure access to adequate, safe and affordable housing and basic services'* for all by 2030 (United Nations 2018; UN Environment Programme 2019). An explanation of the need to consider the past when looking towards the future of housing is discussed in subsequent chapters.

1.6 LIMITS TO THE STUDY

> *The value of an architecture is lost if it is maintained only by way of dead artefacts in a museum setting. Conserving an architecture means to allow it to be constantly reinterpreted in order to keep it relevant (Week 1994: 25).*

The original intent of the research design was to consider four significantly diverse geographic areas to provide a broad coverage of traditional architecture; these being Highlands, Coastal, Island, and Riverine environments. Moreover, these regions are disparate in language and material culture, as well as proximity to national roads and services.

PNG's population is predominantly rural based with acutely limited access to core services for modern life (PNG National Statistical Office 2006) governed by a bewildering diversity of cultural and social values and traditions that make it necessary to clearly define the limits of the study. It would be impossible to do justice if diverging too broadly.

However, time and budget constraints, the physical difficulty of reaching some areas, along with the necessity of finding reliable gatekeepers, meant that the study areas were restricted to the two aforementioned villages to which access was granted: Kunguma (Highlands) and Tubusereia (Coastal), enabling the collection of primary data in the field at these villages. Fieldwork was undertaken from 21 September to 07 October 2016 and again from 04 September to 13 September 2017. Island and Riverine village housing were overviewed via the literature and secondary data collection in the initial stages but were not included in the final analysis as they were deemed to be not sufficiently verifiable and would therefore not add value to the study in terms of comparative analysis.

A further limitation was the inability to visit the Architectural Heritage Centre at Lae Unitech, as it was deemed non-essential for this research at Confirmation of Candidature. However, it is generally acknowledged as the foremost repository of PNG architectural research, much of which is not available elsewhere and had not been made available online at the time of writing (Papua New Guinea University of Technology 2017).

The research field areas and the temporal delimiters adopted for this research are shown in *Figure 1.2*. with Kunguma and Tubusereia being the two villages where fieldwork was undertaken. Background information and cross referencing was through secondary data from Tinganagalip village in East New Britain and Oroi village in Central Province, sourced through personal communication with contacts from those villages and desktop review.

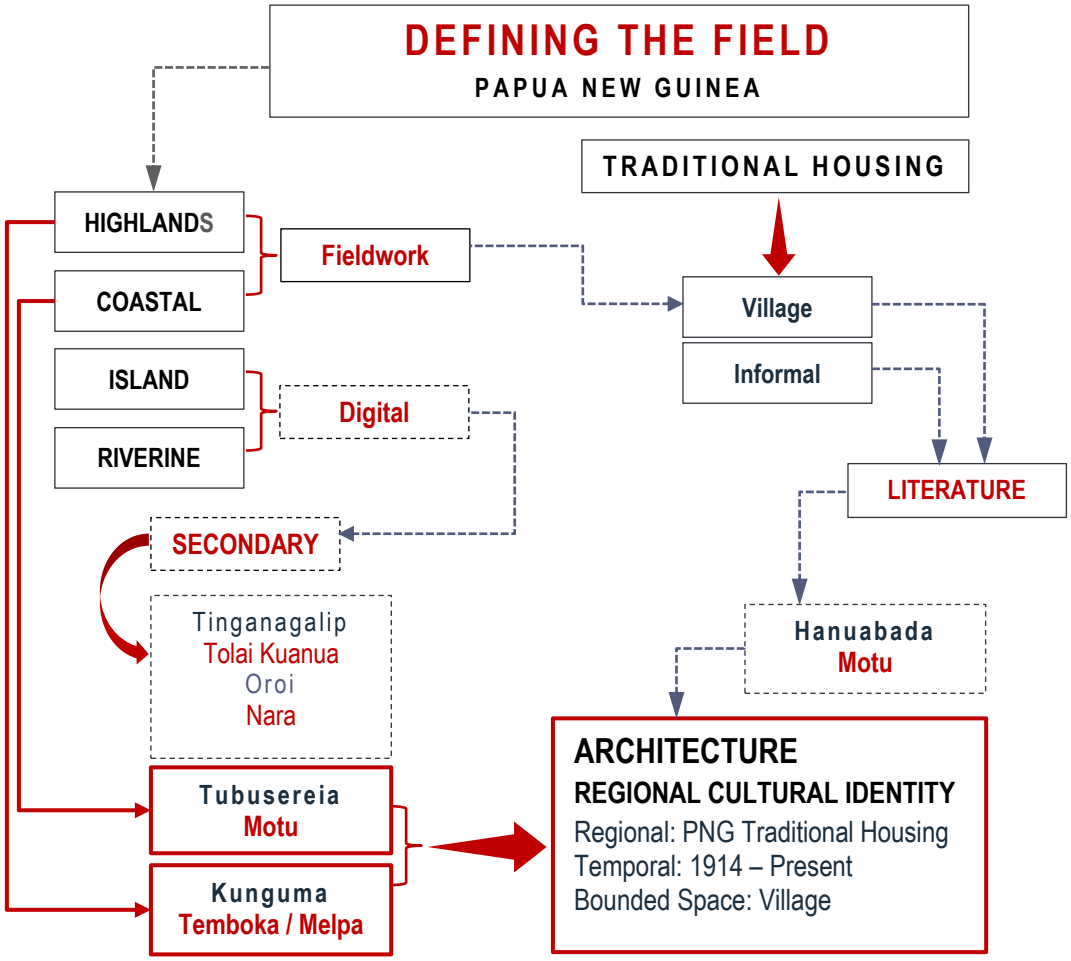

Figure 1.2. Delimiters: Defining the Research Field.
By author. Compiled from research methods in Lucas (2016: 71).

Hanuabada[11] village (*Figure 1.3*) around which the capital of Port Moresby was established in 1883, was investigated through review of the literature. Hanuabada provides an important perspective because it exists as a parallel universe[12] to mainstream urban housing within the broader planning and infrastructure of Port Moresby (Belshaw 1957; Whittaker et al. 1975; Norwood 1979; Maddocks 2012; Hannula 2013). Thus, while it is classed as a *traditional* village, in the sense that it is situated on customary land, it has, to a large extent been subsumed by surrounding development. Traditional urban villages such as Hanuabada are different from informal settlements, with houses constructed on sites determined by inheritance and

[11] Hanuabada: One of the first villages seen by Rev. AW Murray in 1873 (Anuapata – great land) along with Elevala on entering Fairfax Harbour. The London Missionary Society, as was their policy at the time, arranged for land to be given to the missionaries to build on. Subsequently in 1874, WG Lawes was appointed as the first European missionary to live at Port Moresby. He established the mission on a ridge of land overlooking the ocean between Hanuabada and Elevala. (Whittaker et al., eds., 1975: 357-360).

[12] Parallel universe: Development in parallel but vastly divergent from that in Port Moresby city.

negotiation. While services are lacking, there is some security of tenure arising from occupation of their traditional land, as is also the situation at the research field site of Tubusereia.

Figure 1.3. Evening in Hanuabada.
Source: (Sokhin 2013a)

Understanding the context of Hanuabada historically in relation to Port Moresby is the most reliable indicator for a continuum of temporal and spatial settlement patterns. It has had the most sustained contact with colonial missionaries and administrators (Doran, 2007; Hasluck, 1976; Murray, 1912) when compared to other villages in PNG, and therefore the most extensive recorded history, although much of it has been written from the perspective of colonists seeking commercial expansion (Connolly et al., 1983; Doran, 2007; Ohff, 2008).

1.7 GEOGRAPHIC REGION

Papua New Guinea is a group of islands between the Coral Sea and the South Pacific Ocean, east of Indonesia. It shares a border of 820 kilometres with Irian Jaya (also known as West Papua). The western region was claimed as a Dutch colony in 1828 however the current border was not established until 1895 (Tudor 1972: 389) largely to keep the marauding Tugeri in check (Murray 1912). With the end of the Second World War in 1945, Indonesia declared independence from the Netherlands and claimed West Papua as part of its territory, formally making it a province of Indonesia in 1969.

The earliest European impact on the eastern half of PNG (the focus area of this thesis), became more substantial in the latter part of the nineteenth century, as colonial expansion was at its height, with missionaries and traders leading the way. It was partitioned in 1884 into German New Guinea in the northern sector and British New Guinea in the southern sector. The literature indicates that this was at Australia's insistence (Jinks, Biskup and Nelson 1973; Woolford 1976; Doran 2007; Hunt 2017) as the Queensland government was primarily concerned about the prospect of German imperialist expansion in the Pacific and its potential impact on Australia.

Following the German consolidation of their protectorate over German New Guinea and the Bismarck Archipelago, Britain's claim on the southeast portion of the island was subsequently transferred to Australia in 1906 as the Protectorate of Papua (Hunt 2017). Australia placed the German protectorate under military rule in 1914 but were unable to hold it throughout the Japanese occupation of WWII (1942 and 1945). After the defeat of Japan, in 1945 it became an Australian Trust Territory by Charter of the United Nations (Hartnell 1971: 310), administered separately to Papua in the south, until the combined eastern portion of the island gained Independence as a nation in 1975 and was renamed Papua New Guinea. The ramifications of colonial administrative adjustments on PNG architecture will be expanded on in later chapters. *Figure 1.4* shows the many changes in administrative history since the early 1800s.

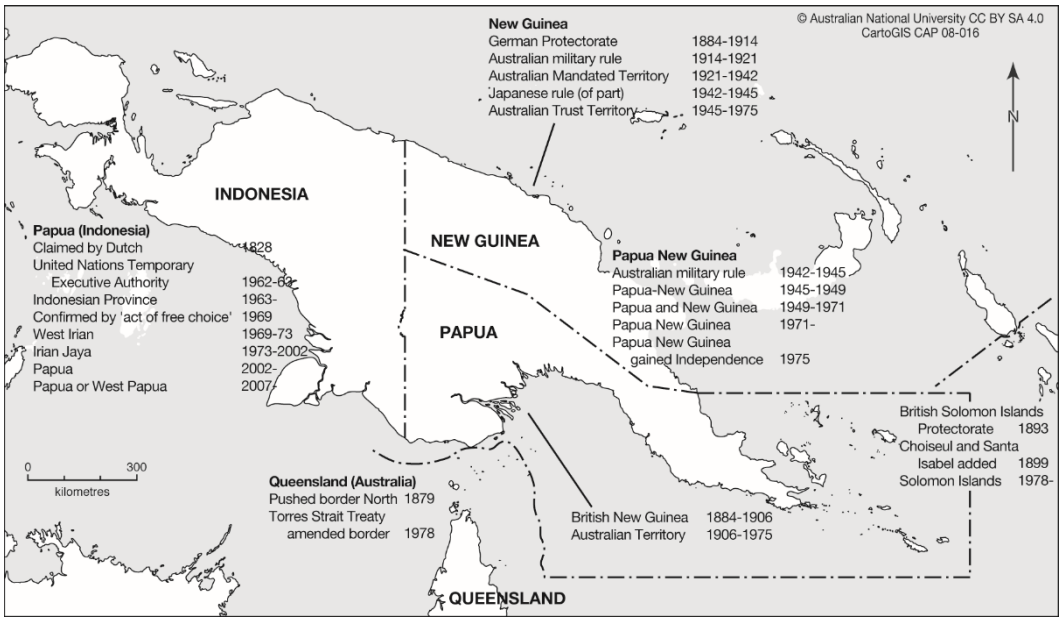

Figure 1.4. Administrative History Map of Papua New Guinea.
(Compiled: CartoGIS Services 2016d, College of Asia and the Pacific, Australian National University).

The geographic variation of PNG reflects its biological diversity, which in turn accompanies an extensive cultural diversity, with the country having more than 800 language groups (PNG Government 2007; Australian Government 2019). Field areas for this research in the Western Highlands and Central provinces of PNG are shown in *Figure 1.5*.

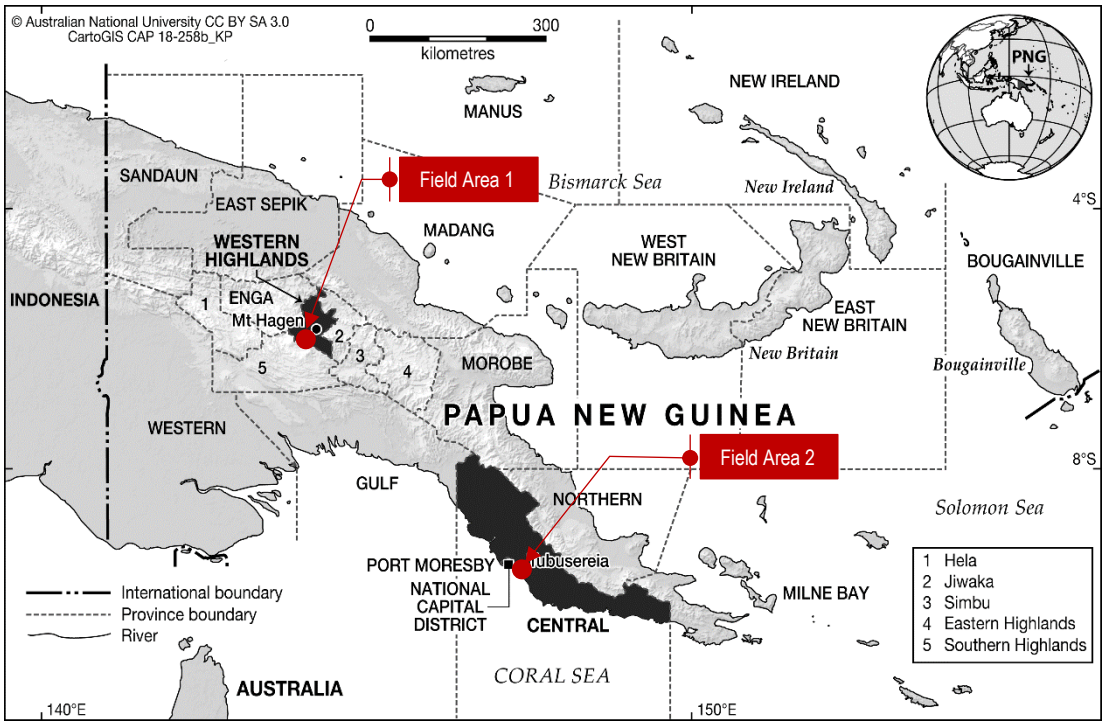

Figure 1.5. Papua New Guinea regional map, showing fieldwork locations.
(Compiled: CartoGIS Services 2016a, College of Asia and the Pacific, Australian National University).

The land area is 462,840 square kilometres, with the country subject to frequent, sometimes severe earthquakes and volcanic activity (PNG Government 2014), the two most recent being in the Southern Highlands in February 2018 (Pacific Beat 2018). A system of 20 provinces, 89 districts and 313 local government areas present substantial challenges for administration and governance (National Research Institute 2010).

Port Moresby, the capital, has an overall 'formal' population of just over 400,000 (of an estimated 500,000 to 750,000 total population) with an average population density of around 16 persons per hectare (World Bank Group 2014b; RMIT Global Cities Research Institute 2015; National Statistical Office Papua New Guinea 2017b). These figures are somewhat nebulous; it is generally acknowledged that confirming exact census figures in PNG is problematic.

Social research findings by the World Bank Group (2014b) indicate that informal settlements have largely been ignored with regard to housing and infrastructure provision.

These findings also confirm that informal settlements are an established and permanent feature of the urban landscape. They describe informal settlements as:

> *… residential areas that have developed outside of the formal urban planning rules of a city, usually in physically marginal or peri-urban areas. They are characterised by uncertain or illegal land tenure; minimal or no services such as water supply, sanitation, electricity, and roads; informal employment and low incomes; and lack of recognition by formal governments. (World Bank Group 2014b: 5)*

Approximately 87% of the total PNG population live in rural areas, some of which are extremely remote, and support themselves by subsistence farming. The main economic activity is cash cropping which provides an informal income to supplement the livelihoods of 80% of the population in PNG (Jones 2012c; RMIT Global Cities Research Institute 2015). From an economic point of view, poverty and remoteness are connected. Nevertheless, while rural communities in PNG may be remote, they generally subsist on their own land, and while they may be cash poor, they have all the food they need through their own production.

Remoteness is related to the country's distance from key global markets (economic remoteness), and is additionally affected by geographic, cultural and environmental factors (AusAID 2012). The main indicator for remoteness classification for this study is the Australian Standard Geographical Classification (ASGC) measure currently used in Australia, validated by the United Nations and World Bank criteria for identifying least developed countries (see Appendix A for criteria details):

- ASGC Remoteness Areas: based on Accessibility/Remoteness Index of Australia (ARIA+) which is a purely geographic approach to defining remoteness. (University of Adelaide 2015).
- RI (Remoteness Indicator) United Nations Development Policy and Analysis Division (DPAD). (UN Department of Economics and Social Affairs 2014).
- RDI (Remoteness and Dispersion Index). (World Bank Group 2014a)

In PNG, the problem of connectivity is exacerbated because there is limited road infrastructure. Although air travel has been available for both charter and scheduled passenger services since the early 1900s, and is often the only viable option, the rugged terrain and unpredictable weather conditions add to the challenges of air travel, both in terms of upkeep and maintenance of airstrips, as well as the treacherous flying conditions. In addition to

scheduled airline services, small aircraft capable of short take-off and landing (STOL) were useful since they could fly up narrow valleys and land on very remote pocket handkerchief-sized rough airstrips (Ward and Serjeantson 2002).

> *Neither roads nor shipping are adequate to bear the moderate systole and diastole of the administrative process: they are supplemented by the airlines and the radio grids to form the administrative arteries and veins coming together at Port Moresby. With two exceptions (those linking Lae with Goroka, and Kavieng with Namatanai) roads out of the townships go nowhere in particular; for outside the towns there are no great concentrations of activity creating economic need for expensive communications. (Rowley 1972: 19)*

The major centres of Port Moresby and Lae are not linked by road to other towns, also largely because of the mountainous terrain and several large river systems. The main highways at the time of writing are:

- The Okuk Highway from Lae through to Goroka, Mt Hagen and Madang,
- Hiritano Highway from Port Moresby through to Kerema, and
- Magi Highway from Port Moresby through to Aroma Coast.

An ethnographic study of the Roro people living about 150 kilometres north west of Port Moresby, conducted in 1982 (Monsell-Davis 1982), discusses the impact of the opening the road between Bereina and Port Moresby in 1973, now known as the Hiritano Highway. It has reinvigorated the village because easier travel to town means those working in Port Moresby have the income to remit money and can return to the village more often, and it has encouraged new entrepreneurial enterprises such as transport and trade stores. However, there is acknowledgment of a clash between the modern focus on individual rather than community concerns and dependence on the cash economy, against persistent traditional mores that emphasise equal, community-based access to resources. Traditional values of prestige and status that were formerly a birthright among the Roro have, as a result, been eroded (Monsell-Davis 1982).

Ideologically roads are more than infrastructure in PNG, representing progress, modernity, and capital and labour flows. Communities connected by road have access to markets, schools and health centres, all of which reduce the incidence and severity of poverty (Beer and Church 2019).

1.8 THESIS OVERVIEW

This thesis is organised into nine chapters, plus appendices.

The introductory chapter provides the general context of the research. The research problem is defined, research questions, aims and objectives are framed, and the significance of the research and limits of the study are outlined. The remaining chapters address the stated aims and research objectives.

Chapter 2: Literature Review

This chapter contains a review of relevant literature pertaining to traditional architecture in PNG and analyses of previous work, to develop the theoretical context that is used to frame the research. Housing transformation processes identified in the literature are summarised for authenticity and significant value.

It highlights the importance of cross-cultural architectural research for marginalised groups, and implications for linking the built environment with social well-being. A comprehensive body of architectural research and theoretical considerations were examined, to provide the basis for the subsequent discussion and analysis. The purpose of the chapter is to consolidate the theoretical framework underpinning the main research question: *What defines traditional architecture in the modern PNG era and how and why has it changed in the places in which it is anchored?*

Chapter 3: Research Design and Methodology

Using the information gained from the literature, this chapter outlines the research design, drawing on ontological and epistemological philosophy to validate the selection of a single-case study strategy. In the broader context of traditional architecture in Oceania, this thesis falls within the realm of cross-cultural architectural research. The methodology presented in this chapter includes choice and justification of the multi-method research approach used when researching transformation of the built environment, particularly for countries of the Global South.

Chapter 4: Methods and Data Collection

The research plan and data collection instruments are presented in this chapter. Issues of reliability and validity that need to be considered due to a lack of specific data available for research studies in PNG generally are also discussed. References to precedent studies in the literature are presented, including common historical threads that link the past to the present and support the choice of methods employed in the study.

Chapter 5: Case Study Results and Findings

This chapter presents empirical data gained from research undertaken in the field, at Kunguma and Tubusereia. The chapter reports the results from participant observation, semi-structured interviews, focus group interviews and demographic data, obtained through several sources of evidence outlined in the research design. These results represent perceptions about transformation and change of PNG traditional housing, including the influences that effect such change, as described by the people in the villages studied.

Chapter 6: Qualitative Analysis

The findings derived from the process of qualitative analysis are provided in this chapter. The chapter revisits the research questions raised, using techniques of thematic coding and ethnographic field methods to explain the underlying reasons for how the built environment has changed in villages. The chapter links the research method outlined in previous chapters to analysis of the data findings and reflection of the literature reviewed.

Chapter 7: Quantitative Analysis

This chapter explores the relationship between the two field sites, using demographic and descriptive data to support the preceding qualitative analysis and test the validity and rigour of the research methods.

Chapter 8: Comparative Cross-Case Analysis

This chapter compares the findings of the villages selected as cases for this research and outlines the similarities and differences with a view to synthesising the results. A summary of the key empirical findings derived from the field research is provided in this chapter. Emerging issues and a synthesis of findings are the focus, including those associated with studying traditional architecture within the wider realm of architectural research, which to some extent challenges the validity of vernacular architecture.

Chapter 9: Conclusion

The chapter revisits the research questions raised and the aims. It provides a summary of conclusions drawn from the studies presented in Chapters 2 to 8.

The chapter concludes by reflecting on the achievements of this thesis, and by proposing areas for future research that would significantly extend the work herein. The appendices include a comprehensive summary of the survey instruments, supporting data and analyses that are only reported in part in the main body of the thesis.

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Chapter 2: Literature Review

> *In architecture, we tend to use the superficial aesthetics seen in history as a way to justify the wrecking or the reproduction of the past. But the new does not exist to simply invalidate or replicate the old. Meter and melody have to work together, or there is no music, frozen or otherwise. (Dickinson 2018: 4)*

2.0 INTRODUCTION

This chapter comprises a detailed review of literature related to traditional architecture in PNG. It examines a comprehensive body of research and opinion that guided methodological choices and provided the basis for subsequent discussion and analysis. Specifically, it focuses on the evolution of PNG housing and the cultural, social, and historical influences affecting transformation.

There has been limited architectural research undertaken on the topic of traditional architecture in PNG which takes into account integral customs and environmental factors that influence the choice of materials, form and construction processes for residential buildings in traditional villages, nor how this traditional knowledge is transmitted from one generation to the next. Therefore an in-depth exploration with methods from other disciplines including history, anthropology, ethnography and human geography, helps to explain the relevance and complexities as they relate to traditional built environment theory (Alasuutari 1996; Chesebro and Borisoff 2007; Dainty 2008; Lauckner, Paterson and Krupa 2012; Groat and Wang 2013). Architecture as a research discipline is relatively new, as is the study of traditional or vernacular architecture within which this thesis lies, emphasising the importance of a cross-cultural and multi-discipline research approach.

2.1 PAPUA NEW GUINEA: ARCHITECTURAL TRADITION AND TRANSITION

A brief history of housing and settlement patterns in PNG were investigated for this research, on the premise that the link between the legacy of traditional architecture, and social practice, can guide policy towards an ecologically and socially responsive built environment.

Although colonisation of PNG began much earlier, in 1914 German New Guinea and British New Guinea were unified when Australia captured German New Guinea. This was a

significant watershed in terms of administrative policy for New Guinea. In the same year, despite the advent of WWI, Bronislaw Malinowski (1884-1942) began his PNG anthropological studies, in which he established his functionalist theory and the participatory observation methodology of fieldwork, initially at Mailu Island southeast of Port Moresby (Murdock 1943; Young 1988; Moore 2003; Nielsen 2015). This anthropological perspective is empirical in that it is based on first-hand observation and is also naturalistic because it views people's lives as they live them (Carrier 2005: 4). Malinowski's theories provide for cultural change posits Murdock (1943: 443), by considering the deviation of activities from norms. Cultural change is relevant for this research which uses participant observation field studies to trace change in the values and norms associated with the production of traditional architecture.

The practice of field studies was relatively uncommon in 1914, although a less well-known precedent for Malinowski was the Russian ethnographer Nicolai Miklukho-Maklai (1846-1888), who in 1871 undertook a fifteen-month intensive field study in New Guinea (1871-1872) at Astrolabe Bay on the Rai coast near present day Madang (Moore 2003: 141). Moreover, the Torres Expedition of 1898 included scholars such as A.C. Haddon (1855-1940), C.G. Seligman (1873-1940), and William H.R. Rivers (1864-1922), a teacher and early influencer of Malinowski, who collectively contributed to the emerging discipline of social anthropology, including material culture, that guided not only Malinowski but other academics working in the Pacific, and thence the protagonists of the Village Studies Project (Young 1988; Eriksen and Nielsen 2001; Holden 2007) on which this research draws.

It is worth noting that schools of anthropological thought share a complicated and contentious history, brought about, arguably, by the historically problematic issue of establishing anthropology and its variants as a scientific discipline (Stocking 1984). Thus while he argues Malinowski's fieldwork observation methods may have been subject to mythic elaboration, Stocking (1984: 70-71) also suggests that scholars *"remain open to approaches that go beyond explicit or implicit disciplinary definitions, in the hope that by defamiliarizing the past, we may perhaps help open up the future"* (Stocking 1984: 10-11).

The Village Studies Project, undertaken between 1971-1975, with the support of the Lae Institute of Technology (Lae UNITECH) was an attempt to document the architecture of all the provinces of PNG as an archival record and resource bank of information regarding traditional construction methods, materials and settlement patterns, on which to ground architectural

education and research (Holden 2011). Providing impetus for this research, the Village Studies Project will be expanded on in greater detail in Section 2.10.

2.1.1 The Human Landscape: Habitat

The relationship between traditional architecture and social practice has its roots in human geography, a science concerned with human institutions or cultures that may be expressed in the *'cultural landscape'*. Human landscape, and by extension habitat, is an accumulation of practical experience and modes of living that involve knowing both the ways people discovered for themselves, and those they acquired from other groups (Sauer 1941).

Hope and Haberle (2005: 541) contend that human geography is an indicator of the widespread adoption of new ways of life that may have erased previous cultures, suggesting that understanding the past may help understand the present. Thus, while physical geography, climate, terrain, and ecosystems have a direct bearing on locality, human geography determined how PNG people lived and what shelters they built in response. It is a key to understanding what exists now and what options there may be for future development, and importantly it provides insight into what drives cultural change and how people adapt to such change.

Other studies in PNG have, to a large extent, looked at the built environment as a peripheral element related to anthropology (Maher 1961; Hauser-Schaublin 2015), sociology (Levine and Levine 1979), material culture (Fowler 2004; Sillitoe 2017a), human geography (Craig 2011), archaeology (Hope and Haberle 2005; Denham 2013; Golson 2017) and the environment (Moffatt 2000; Diamond 2012). In contrast, this research reviews the traditional architecture of PNG as an evolving architecture, interpreted here as vernacular (Oliver 2006) by considering the cumulative effects of colonial impact and the subsequent rapid development of a people from *'stone-age'* to modernity (Anderson and Hogg 1969; Leahy 1994) in little more than 100 years.

Scaffolding this concept is the proposition by Lawrence and Low (1990) that an understanding of built forms needs to be considered in the larger context of society's institutions and its history, noting that "*because they are often able to span more than one generation, built forms become important repositories of cultural information*" Lawrence and Low (1990: 492). They suggest that collaboration between anthropologists and design professionals bringing together mutual concerns with aesthetics, form and production, leads to understanding how the built environment fulfils human needs through its metaphorical connections and ritual practices but that this dimension has not yet been completely explored (Lawrence and Low 1990: 493).

Looking through an architectural lens, Jasper (2017: 1) warns "*architecture has been satisfied with drawing on anthropology for an origin myth or two (usually something involving a primeval hut), and anthropology displays astonishingly little interest in architecture at all, even though the design and disposition of dwellings is one of the key material expressions of daily life.*" It can be argued that Jaspers reference applies more to the practice of architecture rather than architectural research.

Since Oliver (2007) envisaged anthropology as part of interdisciplinary study into vernacular architecture, several important studies have been published about PNG, for example Craig (2011); Hauser-Schaublin (2015); Sillitoe (2017a). Although they deal mainly with the material, social and symbolic significance of architecture, these studies provide evidence of interest in the subject. However, Vellinga (2005) confirms that in terms of applied research, vernacular studies is still the domain of architectural scholars, though not necessarily architectural practitioners.

Sillitoe draws on the integration of anthropology and archaeology in his study of the technological and material aspects of housing in the PNG Southern Highlands. In doing so he suggests that vernacular architecture studies, although approaching construction practices and designs from a narrow architectural perspective, have to a large extent contributed to the study of technology and housing (Sillitoe 2017b). Collaboration with anthropology and other disciplines can therefore situate the study of vernacular architecture with respect to wider issues socially, culturally, and intellectually and can provide for better understanding of the built environment. By reflecting on transitions in the theory and practice of architectural research, this study aims to create a space in future policy for architecture which draws on tradition, while also acknowledging the fluidity of culture where PNG is concerned.

2.2 CULTURAL NORMS AND TRANSITIONS

Narokobi (1983) proposed that Papua New Guineans operated under a true form of Communism not hampered by cultural norms but embracing change if such change could provide a better outcome for both the tribe and the individual. He speculated that Papua New Guineans have been in a state of gradual evolution for thousands of years, with the pace having

increased significantly since colonisation. This dynamism has allowed them to embrace the new freely, without abandoning 'the Melanesian Way'[13], despite the rapidity of more recent change.

> *Melanesians are not and have never been slaves to their cultural practices, if they believed these were obstructing them. They liberate themselves by establishing new communities with new hopes and future. Accordingly, sinking our vision in the past is not to be rooted in a dead and immobile past. To sink our roots in our past is to restore to ourselves our rightful dignity denied us by many whose purpose in Melanesia is to deny us our very existence as human beings (Narokobi 1983: 7).*

At the time of writing his series '*The Melanesian Voice*' for the Post Courier (1976-1978), Narokobi was criticised for romanticising a life that no longer existed. However Golub (2016) posits that Narokobi's contribution needs to be viewed in the context of his role as the first Chairman of the Law Reform Commission (LRC) of PNG between 1975 and 1978, and the fact that the Law Reform Commission was also part of PNG's decolonisation process. When viewed through this lens, and pondering the PNG development trajectory since Independence, a rare sense of perception and philosophy is evident in his writings, specifically related to how PNG has evolved as a nation.

> *Whilst acknowledging our beautiful past along with its constraints, we also recognise the good in the new ways, and mindful too of the bad ways of today. With the freedom we have, we can make conscious decisions to opt for what is best in both worlds […] Will we see ourselves in the long shadows of the dwindling light and the advanced darkness of the evening dusk, or will we see ourselves in the long and radiant rays of the rising sun? We can choose, if we will (Narokobi 1983: 4-5).*

James et al. (2012) suggest the Melanesian Way is sometimes seen as an empty cliché, or a romantic illusion, with the occasional glimmer of an alternative that reflects the concept of allowing PNG to develop through an appreciation of traditional ways of life and culture, including the viability of traditional villages and communities. Nonetheless, it is this glimmer that may hold the key to a more equitable response to housing in PNG (Narokobi 2009; Tanim Graun 2014).

[13] Melanesian Way: Narokobi did not give a precise definition of the Melanesian Way on the grounds that he viewed it as a total cosmic vision of life that can't be quantified. It was said to be based on truths and virtues passed from generation to generation as Melanesians got on with life and living, working together to enhance humanity. It was promoted as an authentic image of Melanesia in search of a new social order that includes both noble traditions and Christian principles (Bablis 2010: 246).

Recent research by Jones (2016) appears to confirm a continuing link between rural and urban villages, indicating that understanding the underlying physical, spatial and social patterns and principles of rural villages could provide a conduit for more effective urban governance from a bottom-up perspective. This research acknowledges the concept of urban villages and consequently investigates housing in rural villages, which are being left behind in the race to achieve more equitable solutions for the city villages proliferating in the wake of urban drift.

> *In the Pacific, the various forms of urban villages in town and city settings are in effect melting pots of traditional village world values and norms, […] reflecting traits that define the identity of the village found in rural areas, namely the centrality of family, ancestry, cultural practices, and commonality of interests including attachment to kin, place, and land (Jones 2016: 7).*

Several sources confirm that Papua New Guinea once possessed a rich traditional built heritage suited to local material availability, climate, human skills base, economy, and way of life (Meyer and Parkinson 1900; Haddon 1921; Salisbury 1970; Crawford 1981; Costigan 1995; Gonduan 2000; Week 2000; Holden 2007; Ebner et al. 2010).

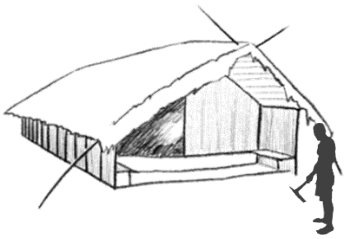
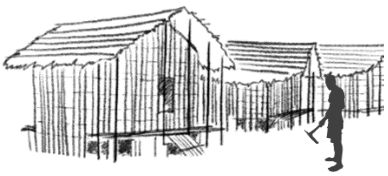
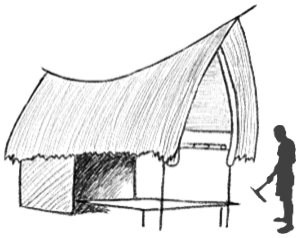
Village architecture in PNG varied enormously from region to region, retaining distinctive styles despite inter-tribal trading and colonisation (Seligman 1910; Williams 1924; Williams 1937; Oliver 1997), which was a time of exponential change in development and cultural heritage for the peoples of PNG. While styles may have remained distinctive, Hogbin (1951) noted in villages around Lae that as early as post-WWII reconstruction, timber planks supplanted wild palm bark walls, and nails gradually replaced rope lashings.

To document the variety of architectural forms that existed in PNG in the early 1900s would almost be impossible. Despite the number of anthropological and ethnographic studies undertaken since that time, many studies documented housing as a secondary narrative to the more substantial body of work devoted to the more elaborate and physically dominating ceremonial houses. Moreover, photographic evidence of house structures was only accessible through museum archives, and many had not digitised their collections at the time this research was undertaken. Nevertheless, a small cross-section on house forms are presented in Table 2.1, along with a brief description of the general regions in which they are located and their approximate scale.

Table 2.1

PNG Traditional House Forms (Sketches: Kyle Wirth).

Sketches compiled from photographic references as noted in the descriptions and reproduced with permission.

Location	Form	Description
		Adapted from Gammage (1975). Kosipe region, a significant archaeological study area, dating human occupation back 44,000 years (Hope 2009a).
		Highlands house. Adapted from a combination of photographs from Clarke (2003) who first entered the Highlands of PNG in 1964, undertaking extensive research among the Maring in the remote Simbai Valley.
		Adapted from Gammage (1988). Telfolip area of PNG, where housing has remained relatively unchanged since first contact. Craig (2011) has written extensively about the material culture of this region and is a valuable resource.
		Adapted from Hasselberg (2015) from a photograph taken by Hugo Bernatzik of elevated living in Buyay village, 1933. The Keveri (or Kevere) area is on the northern side of the Owen Stanley Range, Oro Province.
		Adapted from Young (1988) who has compiled photographs of Malinowski's fieldwork among the Trobriand Islanders at Kiriwina. Ethnographic advice for his book was provided by Linus Digim'Rina.

2.3 PNG ARCHITECTURAL INFLUENCE: EXPRESSIONS OF TIME AND PLACE

Significantly, several of Australia's prominent architects and designers acknowledge that they have been influenced by the architectural traditions of PNG when designing buildings appropriate to their natural environments (Rusch 2015), leading to the questions: Why? What is good to retain?

Glenn Murcutt's early work, for example, is said to have been influenced by impressions from his childhood in PNG (Drew 1991; Narokobi 2009), particularly the long houses (see *Figure 2.1*) which were typified by a narrow rectangular plan and saddleback roof, open under the eaves. The Marie Short House for example (*Figure 2.2*), which brought Murcutt to national attention, allegedly started the debate about what constitutes Australian vernacular architecture (Lewis 2007; Ostwald 2011).

> *Of all the various vernacular house and tent types in the world it is … the long house of the South Pacific regions which most closely resemble the typical Murcutt house as it developed in the 1970s (Drew 1991: 11).*

Longhouses are endemic throughout PNG, often as ceremonial men's houses. During the 1935 Bamu - Purari Patrol, a group of longhouses of the Southern Highlands near Mendi were described as three extraordinary buildings; two being about 96 yards (88m) and the third 80 yards (73m) long, very neatly constructed with roofs thatched with bark and a grass covering (Sinclair 2016). The Kaluli longhouses, also in the Southern Highlands, were described by Loupis (1983: 358) as having *'characteristic ingenuity from an aesthetic and structural point of view, imaginative use of a limited number of locally-available building materials and affinity with the rainforest environment of Mount Bosavi.'*

Government anthropologist F.E. Willams also documented a longhouse at Wasemi near Lake Kutubu, describing it as about 213 foot in length, with the floor space divided by a central passage about 12 foot wide flanked by lateral aisles about 10 foot wide on each side (Schwimmer 1976). Unlike the Kaluli longhouse, the one at Wasemi was exclusively for men.

Figure 2.1. PNG Longhouse at Samagi village, Sumogi Island, Fly River, PNG.
Source: Courtesy of Australian Museum Frank Hurley Collection. V4939

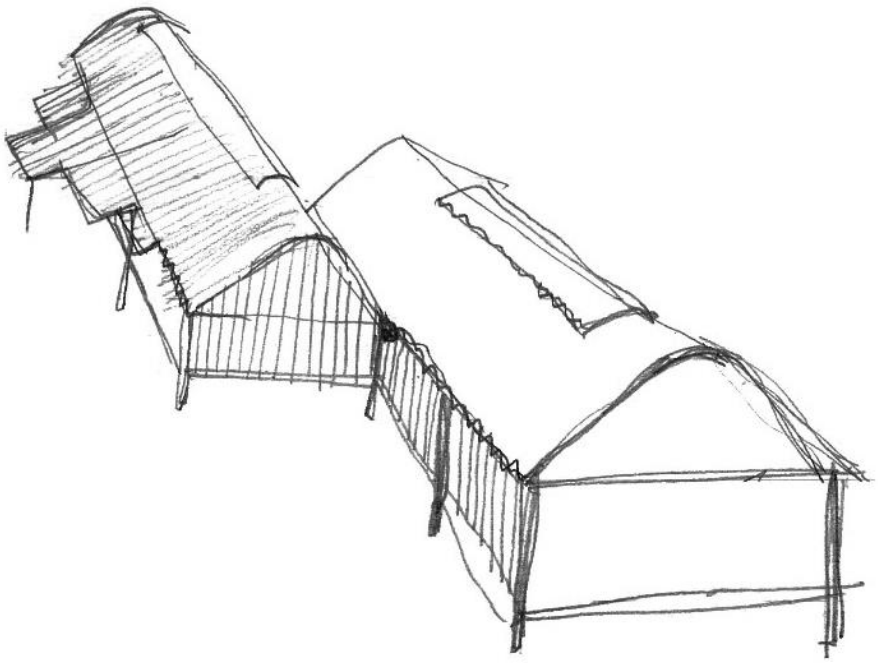


Figure 2.2. Marie Short House sketch by Glenn Murcutt.
Source: Oz.E.Tecture (2008)

Murcutt is also known for his use of corrugated iron which he considered a link to Australian vernacular buildings, representing to him an expression of time and place, possessing properties of lightness, strength and versatility (Drew 1991). This versatility made it the obvious choice for adaptive vernacular architecture.

> *There is probably no introduction to vernacular architecture from western technology that is more universally applied than corrugated, galvanised sheet metal, which meets most of these criteria. Not all – it is climatically often uncomfortable, but it keeps the rain out even if it is noisy; corrugated iron is cheap, easy to fix, more durable than thatch, and comes in sheets of sufficient pliability to fit most roof forms (Oliver 2006: 174).*

Rex Addison similarly acknowledges the impact and compelling value of indigenous architecture sensitive to place, climate, and culture. Addison worked in PNG mainly during the late 1970s and 1980s and is widely acknowledged for his work on Queensland traditional architecture and expertise in designing for tropical heat and humidity. His impression was that the Modern Movement did not have much to offer a country like PNG with such a rich traditional architecture (Riddel and Gosseye 2014). He contends that they already had an interesting way of building. Interviewed for the Australian Architects series Addison said:

> *The problems of working in PNG clarified a number of architectural issues for me. The vocabulary of the modern movement, distilled and pure, had little or no message in a country so far from the 'Mediterranean cradle'. Functionally and semantically, a local building language had to be evolved. These preoccupations continued when I returned to Australia (Vulker et al. 1990: 8).*

Addison's best-known PNG building, the Raun Theatre (1979-1982) as seen in *Figure 2.3* and *Figure 2.4*, was designed with Paul Frame and is a series of forms based on PNG Highland round houses, using traditional materials and forms. Evidence of his concern with structure and joints can be seen in the detailing.

Moreover, Addison obtained the British Thatching Codes and with engineer John Ryder of Arup built an experimental panel, the underside of which was sealed with black intumescent paint to replicate the sooty interior of village huts. It was tested by CSIRO and set the precedent for using traditional thatching in modern context in PNG, while maintaining the required standards for a commercial building. No cranes were used during the construction (R Addison 2015, personal communication, 04 November).

Acknowledged as an iconic building constructed from a blend of traditional and modern materials and a renowned cultural centre for both traditional and contemporary theatre, music and dance, after almost forty years the bush materials used have not been maintained and the building is sadly in need of repair (Kolo 2019).

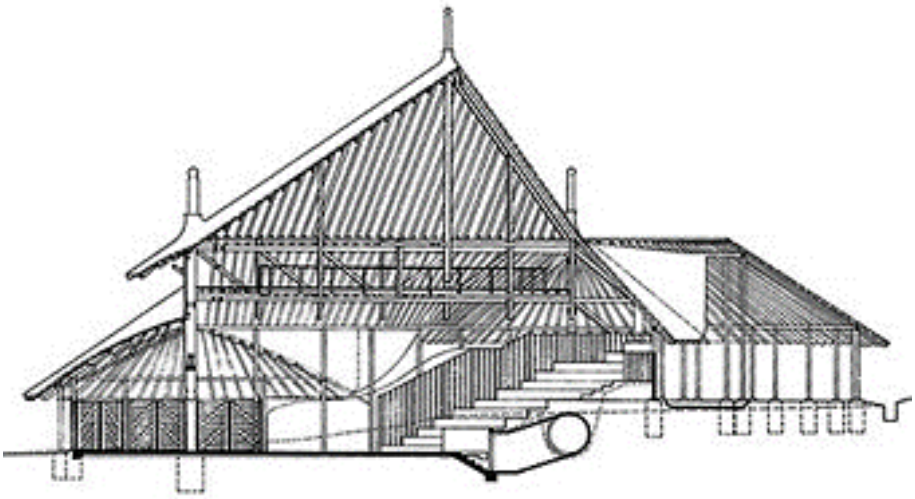


Figure 2.3. Cross Section of Raun Theatre.
Source: Rex Addison. Reproduced with permission.

Figure 2.4. Raun Theatre completed.
Source: Rex Addison. Reproduced with permission.

> *In PNG, any vanities an architect had were quickly brought to account. PNG was like an accelerated building experimental station; it taught me that the best friend a wall has is roof overhang; and mine are flamboyantly big. (R Addison 2015, personal communication, 04 November).*

Another prominent architect, Russell Hall, described his work in PNG as *'The luckiest job of my life'* (R Hall 2015, personal communication, 23 November). Most of Hall's PNG work was for the National Housing Commission for whom he designed low-cost standardised housing

using single skin timber walls, similar in construction to traditional Queensland homes (Watson et al. 2013). In minimum-cost houses, the drive to build cheaply often results in a loss of appropriate performance and pride. Hall simplified plans and changed them to meet local lifestyles; square shape to allow greater repetition of components, generous roof overhangs and single skin walls similar to the Queensland vernacular that he grew up with (Vulker et al. 1990).

> *The National Housing Commission has recently built a 'single skin' house in Tokarara which incorporates many of these principles to give a greater climatic performance by natural means. The designer hopes to improve on methods of climate modification and to improve the specification through experience and to take advantage of new and old knowledge to give the Commission's tenants and customers more value in comfort for the same price (Hall 1978: 2).*

Conscious of the need for cost saving, Hall once salvaged corrugated iron from an army dump and used it in an experimental housing commission home that reflected Trobriand Island style (*Figure 2.5* and *Figure 2.6*) and was much admired by the residents who could identify with the culture; essentially a blending of ideas to meet needs (Watson et al. 2013).

Figure 2.5. Trobriand Island Housing ca. 1922.
Source: (Malinowski 1922) by Project Gutenberg 2017. Argonauts of the Western Pacific. Plate 38.

Hall asserts that he was not definitively influenced by PNG architectural style, nor that his own style influenced his design work there. It did however give him the freedom to experiment with different options for Housing Commission houses, using local materials, with consideration for climate and lifestyle (R Hall 2015, personal communication, 23 November).

Figure 2.6. Experimental Housing Commission home by Russell Hall.
Source: Australian Architects 5. Hall house, left. Standard Housing Commission home, right.

To a large extent the great architectural movements of the day passed PNG by. Most architects working in the country contributed only to commercial buildings in the main towns which, until Independence in 1975, were almost exclusively reserved for expatriates. Housing provision was also mainly for expatriates and the limited number of Papua New Guineans forming the country's new elite (Stretton 1979).

Nevertheless, as previously noted there is a reason why contemporary architects were influenced by PNG traditional architecture, and why it might be worthwhile considering what aspects might be good to retain.

> *Sir William Macgregor regards Kalo as the wealthiest village in British New Guinea. The village is remarkable for the strength and size of its houses; some of the hard-wood piles on which they are built are of very considerable thickness and of great height. We measured some 18 inches in diameter, and 30 feet in height. Many of the planks used in flooring the houses and platforms or verandahs are of wonderful size, especially when one bears in mind the imperfect tools by which they are made. The wood employed is so hard that boards are handed down from father to son as heirlooms, and the house-piles last for generations unless burnt down (Haddon 1900: 288)*

Despite the integrity of the structural elements of PNG architecture, recent PNG government and privately funded housing developments continue to be dominated by an imported Western architecture that is too expensive for most of the indigenous population for whom it was purportedly intended. Largely led by local developers' engagement with international architectural firms, the product is arguably unresponsive to social, environmental, and cultural needs. Affordability is one of the key factors stressed in development goals and is crucial to realising stability, security and a sense of social inclusion (Tanim Graun 2014).

When exploring the gap in the literature regarding the role and scope of tradition, culture, and traditional knowledge of the built environment in modern PNG, it is important to generate research that is relevant and accessible, as well as rigorous (Tranfield and Starkey 1998; Sankaran 2006). Thus this research blended the paradigms of disciplines across the built environment boundary (Penn 2008), specifically those related to housing in other cultures.

This research evaluates the environmental and social improvements that can be achieved with a re-examination of the existing model of housing in PNG which has, to a large extent, moved away from the traditional, at least in the public works arena (Levine and Levine 1979; Weiner 2002; Doran 2007; Maddocks 2012).

History has the capacity to interpret and unlock the past and to help us understand the present (Feil 1987; Clarke 1990). The lens of history is also how we respond to the future. For this thesis then, history is sketched in to provide background context regarding the impact of Western contact on traditional architecture. History, in part, helps address the main research question about what defines traditional architecture in PNG and helps explain how and why it has changed in the contemporary context.

This chapter therefore briefly describes the study in the broader canon of vernacular architecture (Section 2.4), and outlines the historical background, acknowledging past connections and influences (Section 2.5). This is followed by a review of the literature published on the following topics: research on traditional architecture and the evolution of PNG built environment (Section 2.6); key related disciplines (Section 2.7); the influence of colonisation (Section 2.8); pathways for change (Section 2.9) and theoretical precedents (Section 2.10). Discussion about the concept of development and concluding remarks (Sections 2.11 and 2.12) highlight the implications from the literature and introduce the conceptual framework of the research.

2.4 VERNACULAR ARCHITECTURE

> *Welcome to the University of Melanesia.*
> *The ancient, timeless and eternal University.*
> *The village, where courses are constantly offered on living (Bernard Narokobi, cited in Bablis 2010: 239).*

Studies of vernacular architecture are thought to have started in the 1880s (Oliver 2006: xxiii), but were documented more often than not through the lens of European and North American architectural and anthropological conventions (Oliver 2006: xxi). It was not until the 1960s that a serious synthesis of research related to the connections between buildings, cultures and identity of place emerged. Oliver's study of vernacular architecture over a period of more than forty years is significant for its research because it looks across boundaries at vernacular architecture from a cross-cultural perspective. Oliver illustrated that such architecture encompasses the built environment of the people, their environmental contexts, and available resources. In positioning vernacular architecture as a serious field of study within the broader canon of architectural research, Oliver provoked a reconsideration of the value of tradition as a foil against cultural homogenisation in contemporary society (Oliver 1997).

Upton (1996) also challenges the mainstream view of vernacular architecture as a static, romantic ideal, proposing that the acceptance of dynamic change in vernacular architecture avoids stagnation and marginalisation in an ever-changing world, and suggesting that individual action balanced against collective culture provides a more authentic view of tradition. Nevertheless, the fundamental elements relevant to this research are those suggested by Gottfried Semper when explaining architecture through the lens of anthropology: the hearth that formed the sacred focus, the roof, the enclosure and the mound.

Instead of describing building typology as the beginning of architectural expression, Semper considered the more universal elements of traditional structures (Semper 2010). Therefore, although studies in vernacular architecture were gaining recognition at the time PNG was colonised, Semper's earlier explanation is also relevant to vernacular architecture in the contemporary PNG context. At a time when Post Modernism was gaining momentum elsewhere (Fazio, Moffett and Wodehouse 2013), and post-war era interest in planning and urban renewal flourished (Lynch 1960; Fainstein and Campbell 2012), housing in PNG was languishing, and no longer a picturesque reminder of traditional ways. It was overshadowed by economic exploitation of natural resources, the destructive practices that often follow missionary zeal

(Gonduan 2000; Fowler 2004), and caught in an economically stratified society outside international development goals (Bashkow 2000; Goddard 2001; Ohff 2008).

2.5 HISTORICAL OVERVIEW: MISSIONARIES, MERCENARIES AND MISFITS

> *Papua New Guinea had an improbable and unpromising beginning. The target of adventurers, of colonists, and of missionaries, my country has experienced colonial exposure to four nations in a little more than 100 years. At the end of the last century, colonial powers such as Germany and Great Britain duelled their way across the map of the world in the frantic flurry to secure the last available pieces of territory in the South Pacific. (Somare 1996: 2)*

PNG has a long history of human habitation. Pleistocene stone tools recovered in 1964 in the Kosipe region of PNG rewrote history because they indicated that humans occupied the area 32,000 years ago (Hope and Haberle 2005; Hope 2009a). More recent evidence suggests human occupation in PNG stretching back 44,000 years (Hope 2009a) with agricultural irrigation systems and house structures dating back 10,000 years (Muke, Denham and Genorupa 2007; Golson 2017; Golson et al. 2017). Evidence of even earlier occupation may yet emerge.

The '*discovery*'[14] of Melanesia by Europeans began in the 16th century with Spanish and Portuguese explorers seeking new trade routes; the dissemination of Catholicism and commercial interests played a prominent role. Similarly, successive waves of Protestant explorers, zealous proponents of enlightenment and civilization followed, yet their proclaimed scientific reasons for exploration were often overshadowed by political or financial motivation (McFarlane 1888; Chinnery 1920; Woolford 1976; Švambarytė 2008).

Although Swadling (2019) traces trade links between PNG and Asia/Southeast Asia from prehistoric times, by the early 1900s (the temporal limit of this research) explorers from Japan, China and Southeast Asia were comparatively limited in number and largely consisted of private contractors or artisans more interested in establishing trade. Many Japanese intermarried with Papuans and settled in PNG (Iwamoto 1999: 39), predominantly on the German held north coast. Chinese indentured laborers, many of whom also intermarried, were employed on

[14] The term 'discovery' used here is as described by Sinclair (2016, p.xv) in his book 'The Middle Kingdom': 'It is customary to speak of the 'discovery of New Guinea by whites, but this is a European conceit, for Indonesians and Asians knew of New Guinea, and had visited its shores long before the first Europeans arrived.' Indeed, discovery is more recently interpreted as settlement by original peoples based on archaeological evidence.

plantations, as well as trading as shopkeepers, mechanics, carpenters and tailors within the German colonial economy (Inglis 1997).

2.5.1 European Administrative Control Pre-1914

European colonial powers, while acknowledging the existence of indigenous populations, nevertheless considered these areas unoccupied if they had not already been officially claimed by another colonising power (Murray 1912). Thus, despite clear evidence of a thriving population, agreement between Britain and Germany in 1885 resulted in German administrative control over the north-eastern quadrant of mainland New Guinea, with Britain claiming control of the south-eastern quadrant, the London Missionary Society already having established a base in the Protectorate of British New Guinea in 1874.

The western half of the island had previously been claimed by Holland as part of the Dutch East Indies in 1828 and would remain in their control until the mid-1970s when Indonesia took control of what is now known as Irian Jaya or West Papua (McFarlane 1888; Hogbin 1951; Oram 1976; Zimmer-Tamakoshi 2007).

It appeared that little had changed in PNG during the intervening years, when in 1888 Australia annexed the Protectorate of British New Guinea in a strategic move aimed at preventing an attack on Australia by Japan (Murray 1912). Substantiation of any desire by Japan to attack has proved fairly scanty (Frei 1984; Oliver 2002), rather its interest in the Pacific resulted from the easing, around the mid-1800s, of the 200 year Tokugawa self-imposed isolationist policy (Iwamoto 1999; Švambarytė 2008). Japan was, arguably, more concerned about losing influence in its own region, particularly Malaya, Indonesia and the Philippines due to the growing naval dominance of America, Britain and Holland, and furthermore, in securing raw materials from south-east Asia (Frei 2000; Oliver 2002).

German New Guinea was also annexed in 1888, ten days after Australian appropriation of the south-east, primarily to protect the commercial interests of the Neu Guinea Compagnie's (NGC) administrative control over north-east New Guinea, which had been empowered by German Imperial Charter. Investment in trading, tropical agriculture (copra) and mining was a significant financial risk for NGC without support from the state, and therefore the need to secure a return on investment was paramount, rather than any desire by Germany, at that time, for military expansion in the Pacific (Ohff 2008). By the time Malinowski (Murdock 1943; Nielsen 2015) published his 1915-1918 ethnographic study of the Trobriand Islanders, the Western world was engulfed by World War One (WWI) and industrialisation, while Melanesia was still

immersed in pre-history in 'the land that time forgot' (Anderson and Hogg 1969: 11), with its traditional architecture a reflection of this dichotomy.

Missionaries, who had pioneered much of the known area in the German territory and that of Britain, lived in traditional houses built by villagers. At the turn of the century it was the Australian Administration's policy to entrust missions with a civilising agenda of education, '*spiritual and moral instruction*' (McFarlane 1888; Murray 1912; Salisbury 1970) and it was they who initiated first contact in many areas. This could be partly attributed to a continued lack of financial support from the Australian Administration (Doran 2007). What little resources were made available went to development of port facilities and to support European interests (Oram 1965; Langmore and Oram 1970).

Villagers were, by and large, not interfered with where housing was concerned (Oram 1965; 1976; Maddocks 2012). While European contact was generally confined to coastal areas, traditional trading patterns meant that exposure to new ideas gradually permeated unexplored areas. Although missionaries had penetrated further inland both from the north coast and the south, for miners and settlers these areas were considered unsafe due to inter-tribal raids and fighting (Haddon 1900; Williams 1924; Moore 2003).

2.5.2 Evangelisation, Colonisation and Meddlesome Care

By the early 1900s it was clear that PNG represented a shield of defence for Australia. The then Australian Prime Minister, W.M. Hughes, was quoted in the Paris Peace Conference minutes of meetings January 12 to February 14, 1919 as saying:

> *Strategically the Pacific Islands encompass Australia like fortresses. New Guinea was the biggest island in the world save Australia itself, and was only 82 miles from the mainland […] The islands were as necessary to Australia as water to a city. If they were in the hands of a superior power, there would be no peace for Australia (US Department of State 1958: 720-21).*

Australia seized German New Guinea at the beginning of WWI, along with its plantations and other commercial assets, some of which were expropriated and given to Australian war veterans (Inglis 1997; Ohff 2008). Military rule lasted until 1921 when Australia received a mandate from the League of Nations to govern the new territory. PNG had by that time become a trophy, due to its mineral resources, agriculture, and cheap labour.

On the one hand there was a view that traditional society was unchanging, yet later studies suggest that cultural borrowings from elsewhere were endemic.

> *What was seen by the first European explorers was not 'age-old traditions persisting for centuries,' but the current versions of rapidly changing sets of behaviours (Salisbury 1970: 2).*

While both missionaries and the Administration adopted a laisse-faire approach to native architecture in the early years, destruction of the old ways was often actively encouraged, either punitively[15] or symbolically. In both German and British New Guinea burning of whole villages as punishment for attacks on settlers, while not common, started as early as 1890 in East New Britain (Salisbury 1970). It was also a tactic used by indigenous tribes themselves during inter-tribal warfare (Chalmers 1886; Chinnery 1920; Williams 1923), and it can therefore reasonably be deduced that village destruction was a familiar punishment, and tacitly understood when enforced.[16]

Hubert Murray, the Territory of PNG's first Australian Lieutenant-Governor (1907-1933) acknowledged the burning of a ceremonial men's house in the Gulf District in 1908, as punishment for the hunting[17] of two white men by a group of villagers. Murray saw ceremonial buildings and their associated spiritual significance as a source of social cohesion and wanted to show, by their destruction and other measures such as imprisonment, that resistance to white rule was futile (Williams 1924: 8-9). Therefore, although the Administration's policy, generally, was to refrain from interference, their attempts to bring peace and order had more far-reaching repercussions.

Haddon (1921: 20) compared the *'stone-age savagery'* of the Papuans with European Iron Age culture and yet warned that *'meddlesome care, when based on ignorance, is apt to defeat its own ends'* (Haddon 1921: 55), referring to the encouragement of *'natives'* to change

[15] Burning of village houses for punishment was undertaken for several reasons at different locations, but retribution for killing a European, or the destruction of non-Christian idols were thought to be among the driving factors.

[16] In *Dangerous Woods and Perilous Pearl Shells*, Strathern and Stewart (2000: 78) note that it was a common practice in Pangia in the Southern Highlands to burn down entire villages during warfare to displace enemy groups, thereby prolonging the time before a regrouping and counter-attack could be attempted.

[17] Although the white men had found refuge at another village, such punishment was considered a deterrent against future attacks.

their housing material and village layouts to conform to the European ideal, which was not suited to the local climate in the same way that their own traditional housing was.

Evangelisation and modernisation however also brought a growing desire by Papuans themselves to discard the old ways and embrace the new (Maher 1961; Salisbury 1970; Hassall 1991). Haddon noted as early as 1900 that some villagers in Tubusereia (Tupuseleia) were building on land rather than over the sea, although previous '*Native*' Regulations had required coastal villages, including their latrines, to be built wholly over the sea so that waste could be carried out by the tide (Haddon 1900; Maddocks 1976).

> *The village of Kapakapa was formerly a purely marine village, but, like Lakwaharu (Tupuseleia) and Gaile, the inhabitants are also building on the shore. Sir William Macgregor encouraged this departure; but Mr. A.C. English, the very efficient Government agent for the district, states that it is regrettable from a sanitary point of view, as the 'natives' are far cleaner and healthier in their villages built over the salt water. (Haddon 1900: 284)*

The long-term effects of building on land are discussed in relation to the Coastal field area of this research in Chapter 5.

In addition to the Australian Administration and missionaries encouraging modernisation, an embrace of new ways by Papua New Guineans themselves subsequently resulted in their own destruction of ritual objects associated with traditional ceremonies in and around the Vailala area in the Gulf District in 1919 (Williams 1923; 1924) This *'Vailala Madness',* as it was later referred to, was said to be based on belief in a European style world of material abundance, symbolising a condition of spiritual renewal and the return of the ancestors (Essai 1961; Maher 1961; Souter 1963; Stent 1977; Oram 1992). Missionaries also reported the destruction of buildings in Gogodala in the 1930s (Crocombe and Crocombe 1982: 107) for similar reasons. Williams (1940: 431) suggested it was predominantly '*native*' missionary teachers, zealous in their belief that the new ways were good and the old ones bad, that emphatically preached against traditional ways, however he does not specifically explain why *'cargo cults'*[18] (like the '*Vailala Madness*') as they were later known, erupted in some mission areas and not others.

[18] Bell (2006) who has undertaken extensive field research in the Gulf Province, describes the cargo cults mentioned here as a struggle for economic self-sufficiency. He states, 'In each of these cases villagers expected vessels piloted by ancestors filled with cargo made by the deceased' (p. 229).

Nevertheless, he posited that replacing the old ceremonies (*'and all that they entailed')* with Christianity, left a dangerous vacuum (Williams 1923; Schwimmer 1976).

Conversely, Lienhardt (1997) posits that the Vailala Madness and other cargo cults throughout PNG and other Pacific islands did not fit the functionalist theory of Malinowski and Williams, which did not allow for the dynamism of traditional societies, thereby supressing their right to be full and equal participants with real influence and power in a modern world.

This is validated by Kaima (1990) who contends that in the wider Melanesian context cargo cults, while initially a form of resistance against colonial administration, were a response to an evolutionary process of religious beliefs integrated with traditional value systems, which subsequently developed into unified political pressure groups. These theories align with one put forward earlier by Steinbauer (1979) that cargo cults appeared at the end of WWI amid increased anti-British sentiment while at the same time traditional ceremonies were abolished, and men's houses torn down. He contends that elements of social justice, wherein cargo cults offer an escape from suppression and poverty and dreams of a better world, were a contributing factor. Other researchers have attempted numerous interpretations regarding the reasons for the Vailala Madness and other '*cargo cults*' however, for this research, the issue of importance is that housing is more than merely the physical structure, but reflects a complex set of social, environmental, economic and cultural beliefs, practices and constraints.

What is undeniable however, is that the after effects of the WWI military conflict, coupled with the demand for unskilled and semi-skilled labour required for plantations and mining, significantly impacted life for the people of PNG (MacWilliam 2013) and their architecture. Nevertheless, most of the indigenous population continued to reside in villages in the period between WWI and WWII (Hogbin 1951; Oram 1976; Robinson 1981). In the towns (for example Port Moresby, Rabaul and Lae) where the demand for indentured labour was most significant, separate labour compounds were provided for migrant workers by employers, but these, and the urban villages, were outside town boundaries (Langmore and Oram 1970) and except for work, Papuans were physically and socially excluded (Oram 1976).

2.5.3 Expansion, Exploration and Pacification

The inter-war years were a time for expansion, exploration, and *'pacification'*, particularly of the mountainous interior in the former German territory. In 1926 the discovery of gold at Edie Creek in the Wau-Bulolo area sparked a gold rush and large-scale mining of the Bulolo-Watut river system, thought to be one of the largest gold fields in the world at that time. Once again,

the overriding desire was economic. Similarly, the Leahy expedition to the Central Highlands (Leahy 1936; Connolly and Anderson 1983; Sinclair 2016) was in search of gold or other resources. Leahy described housing in the areas he explored, one of which was the Western Highlands field area of this research, which is discussed in more detail in Chapter 5.

> *The village houses in this country were not tightly grouped and surrounded by a barricade of cane, as in the Goroka Valley. Their houses were much bigger and better built, some round and some long and rounded at each end. They were built of saplings and bound together with vines with a very weatherproof grass-thatched roof, from the top of which as many as four or five long sticks or bunches of zamia tops, were tied […] the slow smoky fires kept the occupants warm and reasonably comfortable if they reclined below the smoke level (Leahy 1994: 81-82).*

Rabaul, previously the German colonial capital, on the Island of New Britain, was the regional base for the Territory of New Guinea until the old town was practically destroyed by the joint volcanic eruption of Tavurvur and Vulcan on the Rabaul caldera in 1937 (Heming 1974), after which the Australian Administration moved to Lae on the mainland. A similar dual eruption had been previously reported by early missionaries and explorers in 1878.

Chinnery (1934) noted during his 1927 ethnological survey of the Waria, Wade and Bialolo River areas around Lae[19], that the village housing had changed to meet ideals introduced by Lutheran missionaries. Most houses were arranged in neat rows and were built on stumps instead of being on the ground, although traditional building materials were still in use. Meanwhile by 1932, on the developing southern coastal fringe, the cluster of three Motu speaking villages of Elevala, Tanobada and Poreporena, collectively known as Hanuabada, was the only village to receive any urban services, however inadequate, with most village expenditure paid for by the 'Native' Taxation Fund rather than the Australian Administration.

> *Innumerable cultures reflect their ancestry, clans, lineages, age-sets and phratry divisions in their settlements in ways that are not immediately perceptible but are, nonetheless, meaningful (Oliver 2006: 179).*

[19] Lae, the capital of Morobe Province is the second-largest city in Papua New Guinea. It is located near the Markham River delta and the start of the Highlands Highway, which is the main land transport corridor between the Highlands region and the coast. Along with Rabaul and Salamaua, Lae became a major Japanese base in the Second World War.

Housing development throughout the country was already splitting into three main groups: Europeans, 'natives' and others; mainly Asians including Chinese, Japanese and Malays, who had some European status, but could neither buy freehold land nor live in the European enclaves. Several researchers speculated that the Japanese, especially, were offended by the restrictions placed on them, considering that they had been British allies during WWI. Their inability to secure a racial equality bill at the Paris Peace Conference was a loss of face and resulted in a lack of trust in the Anglo-Saxon West and, arguably, contributed to their entry to WWII (Shimazu 1998; Iwamoto 1999; Oliver 2002).

It is conceivable that the work of Asian artisans may have influenced the architecture in the areas they settled, particularly as many inter-married and lived in villages, however, as much of this was in German New Guinea, it has been difficult to source records.

Figure 2.7. Japanese woman in traditional costume. Boong Market Rabaul ca.1936.
Source: (Sarah Johnston Chinnery Collection National Library of Australia http://nla.gov.au/nla.obj-144297391).

On the north coast ANGAU[20], besides being responsible for indigenous administration, had primarily been deployed to supervise labour for the armed forces at Rabaul and Lae during

[20] Australia New Guinea Administrative Unit. Established in 1942-43, it exercised the joint authority of the Army and the Australian Department of External Territories and progressively took over the government of the northern districts of Papua and of New Guinea as the Japanese were driven back. After 1946 a gradual handover was effected by the United Nations Trusteeship Council, which brought about the permanent Australian joint administration of both Papua and New Guinea in 1949 (Tudor 1972: 60).

and after the Japanese occupation. While European civilians could move further inland or be evacuated to Australia or abroad, no such option was available to indigenous employees, many of whom had been brought in from the Sepik River, Madang and other distant areas (Hogbin 1951) and had no means to return. Caught between the Japanese and the allies, whole villages were obliterated along with most of their material culture. Indigenous conscripts away from their villages were unable to care for their families nor reconstruct their homes (Maher 1961; Robinson 1981). Furthermore, Hogbin (1951) noted that those villagers not conscripted were pressed into supplying sago thatching for the army on an unprecedented scale so that not only did they have no time to keep up productive gardens or repair their own housing but the damage to, and the destruction of sago palms seriously impacted their ability to re-establish themselves after the war. While the significance of the New Guinea campaigns during WWII cannot be overstated, they have been well documented in other research (for example Robinson 1981) and are mentioned only to show the impact on the social life and therefore the traditional built environment in PNG.

The unexpected Japanese invasion in 1941 lasted until the end of WWII (Oram 1976; Frei 1984; 2000; Švambarytė 2008). Despite earlier Japanese settlers having peacefully established copra plantations, trochus shell fishing, boat building and pearl diving businesses in PNG (primarily on the German side), at the outbreak of the Pacific War Japanese residents were arrested and interned in Australia. Their properties were seized as spoils of war. They were repatriated to Japan at the end of WWII and were not allowed to return, effectively ending the early Japanese settlement of PNG (Iwamoto 1999).

2.5.4 World War Two Aftermath

In 1949, after WWII confirmed New Guinea's strategic importance to Australia, the Australian Government formalised its administrative control over the unified eastern half of the island as the Territory of Papua and New Guinea under an international trusteeship system, with PNG subsequently gaining Independence in 1975 (Doran 2007; Ohff 2008). It clarifies what Somare (1996: 2) eloquently described as the colonial *'frantic flurry to secure the last available pieces of territory in the South Pacific'*. Irrespective of the trust placed in Australia, few funds were directed to the development of the country, with responsibility for education and health left largely to missions (Oram 1965; Doran 2006). Nonetheless, WWII was a catalyst for change in administrative policy in terms of housing and urban development.

2.5.5 Hanuabada: The Great Village

Hanuabada remained relatively unaffected by dramatic change until after WWII, when fibre cement and timber cladding, metal roofs and other salvaged materials, gradually replaced traditional ones, incrementally transitioning away from cultural ideals. This was more evident where thatched houses built over the sea succumbed to expansion of infill housing of scavenged materials, particularly after the post-WWII reconstruction (Belshaw 1957; Maddocks 2012). At Hanuabada, the Administration built some houses over the sea to replace those destroyed during the war (*Figure 2.7* and *Figure 2.8*). Many villagers were not entitled under this scheme and therefore began to build houses on the land, often with materials discarded by the military after the war.

> *Hanuabada had been destroyed by fire during the war and was re-built by ANGAU with European timbers and iron roofs. Other villages had to fend for themselves, and scrounge for leftover materials from the army camps around the area (Maddocks 2012: 157).*

Figure 2.7. Hanuabada Village 1943.
Source: (Brown 1943b) Australian War Memorial Collections. Roof thatching removed in case of fire.

Figure 2.8. Hanuabada after it had been swept by fire 1943.
Source: (Brown 1943a) Australian War Memorial Collections.

Belshaw (1957) confirmed that houses were built for only 50% of families, with the remainder having to put up shanties according to their means. The houses were 18 x 36 feet (5.5 x 11.00m approximately), constructed of timber with corrugated iron roofs, using village labour under European supervision. No provision was made for '*kitchens, interior walls, wash places or lavatories and in practically every case owners are adding these fittings as their resources – mainly scrap iron and timber, and odd paint – permit*' (Belshaw 1957: 98). As one Hanuabadan described the newly constructed houses for those that were entitled:

> *We were all looked after by Australia and British. New housing was the white people way of building; just sort of … a house with a roof on, you know something like that; that's it. No bedroom, nothing, just a house. Yeh, yeh, just a shell. It looked nice but when you went inside nothing there, just open timber and corrugated iron. They built it nice you know but when you walk in its just a little fireplace and things like that … that's all I remember. (Tamasi Drieberg 2014, personal communication, 29 June).*

Langmore and Oram (1970: 46) recorded that by 1966 Hanuabada had absorbed two other villages, Tatana and Baruni, but there were also other urban villages of Motu/Koita landholders incorporating a small number of migrants from the Central, Gulf and Western

districts who had traditional trading links with the Motu villages. In addition, there were over twenty village-like settlements of migrants from the Highlands and other parts of PNG building clusters of housing on indigenous and administrative land, in and around Port Moresby. These residential complexes were largely heterogeneous communities that continued to expand with increased migration (Oram 1965; Langmore and Oram 1970; Oram 1976). Overtaken by permanent infrastructure and buildings that now comprise Port Moresby, the Hanuabada village complex has arguably been the most affected by settler colonialism.

> *Missionaries and the Administration 'bought' land from the Motu-Koita, especially those of the Hanuabada village complex, initially paying with items of clothing and axes […] By the end of the colonial era (the 1970s) the de facto loss of their land to what had become a city of migrants was developing into a major issue for the Motu-Koita. (Goddard 2008: 42-43)*

Inadequate urban housing conditions as a result of exclusion from decision-making and the lack of socio-economic structures put in place prior to, as well as after, Independence have had a negative effect, despite the cultural and physical links to ancestral lands. By 1966 Hanuabada was only one of two remaining indigenous villages within the Port Moresby city boundaries and, as noted by Langmore and Oram (1970: 51) was an area in which people were *'forming communities and learning to become town dwellers'*.

2.5.6 New Horizons for an Emerging Nation

The end of WWII coincided with the start of a mass movement of migrants from other parts of the country that the Administration did not, and had never, provided for, particularly in the main towns of Port Moresby and Lae. From the beginning of British rule, cheap indentured labour had been brought in from rural areas with a general policy that required repatriation back to home villages at the end of three-year contracts. There was no intimation that large numbers of rural people, in search of a livelihood or a different way of life, may have wished to establish themselves in town and, in doing so, would require somewhere to live.

The war had exposed the many indentured labourers working for Americans and Australians to the higher living standards and prestige enjoyed by Europeans (Maher 1961; Riseman 2010) in comparison to their own, and to a money-centred economy from which they had been largely excluded. Riseman (2010) describes World War II as a brief interlude to the unequal relationship between colonisers and colonised, stating that post-war reconstruction brought reforms while preserving the underlying dominance of the Europeans at the expense of

equality for Papua New Guineans. Conditions of rapid economic and social upheaval, as occurred in PNG, are apt to lead to discontent; even anarchy, often with unexpected ramifications (Hundloe 2009; Collier 2010; Hundloe 2015).

Charismatic leaders emerged, with a desire to attain the trappings of what they perceived as a modern, more affluent life, attracting large followings which led to several cult-like movements. One of these was known as the Tom Kabu Movement. A considerable amount of literature has been published on Kabu (Maher 1961; Hitchcock and Oram 1967; Maher 1984; Hassall 1991), but the key feature for this research is the movement's deliberate destruction of traditional housing. Kabu was from the Purari[21] area of the Gulf District, where tribal warfare, ceremonies and cannibalism had gradually been suppressed. Increased contact with European culture during the war, which included travel to Australia with the Papuan Infantry Battalion, stimulated new ambitions, values and nationalist aspirations in Kabu (Hitchcock and Oram 1967; Hassall 1991; Oram 1992). Among these was the desire to raise the living standards of Purari society and to move to a new way of living. In doing so he advocated the burning of ceremonial houses, the relocation of villages and the construction of new houses resembling those he had seen in Australia (Pixley 1981; Oram 1992).

While the 1917 Vailala Madness destruction of traditional villages was based on belief in a European style world of material abundance, (Maher 1961; Stent 1977; Oram 1992) the later Kabu Movement (circa 1946-1969) (Pixley 1981; Oram 1992) for example, sought destruction of the *'Ravi'*[22] ceremonial houses as a rejection of the backwardness of the Purari culture (Hassall 1991: 31). Numerous studies have conclusively shown the gradual dismantling of traditional ways of living, an increasing flow of people to Port Moresby and other major centres, and the subsequent establishment of settlement housing (Belshaw 1957; Langmore and Oram 1970; Maddocks 2012) are all, in part, due to inadequate successive enforced administrative policies implemented since colonial settlement. Their impact on the social and architectural changes that have ensued are shown in Table 2.2.

Table 2.2
Summary of Administrative policy on 'native affairs' and housing.

[21] The Purari are composed of six linguistically and culturally related but self-described 'tribes'—Baroi, I'ai, Kaimari, Koriki, Mai-pua and Vaimuru - that dwell on the Purari Delta's flood plains (Bell 2009: 30), a tidal estuary in the Gulf of Papua, about 250km NW of Port Moresby.

[22] The '*Ravi*', large ceremonial longhouses built on piles with thatched roof, high and peaked at the front, sloping sharply down towards the rear, could accommodate more than 100 people. Similarly, the longhouses of the Sepik area, which Bateson thought splendid, comparing them to '*the nave of a darkened church*' Bateson (1958: 123).

By author. Compiled from literature: Murray (1912); Jinks, Biskup and Nelson (1973); Oram (1976); Maher (1984); Turner (1994); Fowler (2004); Doran (2007); Maddocks (2012).

Date	Administration	Policies and Practices	Agenda
1874	London Missionary Society (Lawes)	Civilising agenda to save 'lost souls.'	**Tradition was to be abandoned**
1888	British New Guinea annexed. (Sir William MacGregor)	Worked in collaboration with the various Mission interests. Committed to the principle of 'for the benefit of the natives' Restricted the movement of labourers to no more than 10 miles from their villages to avoid breaking up traditional communities and relationships.	**Tradition was evil and a hindrance to development** Burning of Goaribi Kalo by Administration, for retribution and lesson teaching
1901	British New Guinea handed to Australia	Collection of knowledge particularly ethnography, anthropology, and linguistics. Goaribari massacre.	**Tradition as a fascination to be studied**
1907	Hubert Murray appointed as first administrator of the new territory as Lieutenant Governor	Explore, extend area of control, pacify, civilize, and develop the Territory of Papua for the benefit of the Papuan population. Village men from remote districts entered into extended indentured contracts to avoid importing labour from China, Malaya or the West Indies: Immigration Restriction Ordinance of 1907 to protect the Papuan (Murray 1912)	**Traditional architecture collateral damage to colonial progress** Burning sacred objects at Vailala and Orokolo by villagers, thought to be semi-religious and cargo cult reasons
1914	Australia captures German New Guinea.	PNG used as a buffer against invasion of Australia. PNG peoples caught in competing and often conflicting war time allegiances. Village social and economic life deprived of physically fit men.	Protection of colonial interests.
1923	Government anthropologist FE Williams appointed	Believed that mission influence could have a detrimental effect on village populations, culture, ceremonial life, identity lifestyles and housing. Missions relied upon to run schools and hospitals for underfunded government administration.	**Tradition seen by Williams as essential to life, identity, and well-being of the communities**
1926		After the Vailala Madness some reconstruction of new eravo (ceremonial houses) by villagers took place (Kerema 1925-1926).	**Fervour of local Christian converts** Burning of Gogodala 1930 by Christian villagers (Crocombe 1982)
1939		Burning of Orokolo 1939 by villagers	**Persistence of LMS**
1942	Colonial administration replaced by military - Port Moresby as US advanced base in the Pacific	Rabaul fell to Japanese 23rd January and Port Moresby was bombed 5th February. Many Papuans fled back to their villages. Hanuabada and other urban villages evacuated for use by military.	**Tradition could co-exist with the acceptance of modern ways – but not in 'town'**
1950s	Australian New Guinea Administrative Unit (ANGAU) Post war reconstruction	Administered by the Department of 'Native' Affairs under the auspices of the United Nations Treaty. Decay of traditional ceremonies and work result in a drift away from village life	**European style building in 'town'. No discernible difference in villages.** Prefabricated houses imported
1960s	Rise of articulate nationalists seeking better conditions for Papua New Guineans	Squatters in Port Moresby due to rural – urban drift estimated at 30,000 leading to overcrowding, poor or no sanitation and 'sub-human' housing conditions. Increased migration of women to urban centres.	**Employment of more overseas community development advisors** Housing provision almost exclusively for expatriate workers
1970s-1980s	Independence Papua Niugini Government	Rapid and uncontrolled urban migration. Accommodation in rudimentary accommodation provided by European employers for single men. Migrant presence in town thought to lead to moral decay and crime.	**Urban migrants seen as temporary** Forced repatriation policy at end of work contract and eviction of squatters on traditional lands too difficult to implement.
1990s - 2000s	Papua Niugini Government	Global recognition of resources availability leading to increased wages. Regional leaders attempt to encourage employment of local workers to keep out migrants. No access to urban infrastructure or basic services in villages and informal settlements. Accommodation provision left to relatives and self-help resulting from 1986 deregulation.	**Emerging landless class and new elites** Sporadic bulldozing and forced eviction of squatter settlements. Long term family migrants have few, if any ties to villages and are dispossessed of tenure rights.

2.5.7 Independence and National Housing Goals

The Pangu Pati (Papua and Niugini Union political party), formed in 1967 in response to what indigenous Members of the Legislative House of Assembly perceived to be a lack of commitment by Australia to implement effective PNG self-government, insisted that *'the only way to learn and be ready for government is by doing, by actual practice in the work of governing and by working harder for greater prosperity and a higher standard of living. If self-government is suddenly thrown upon us in the future, without any preparation for this responsibility, we will be unready, untried and untested'* (Doran 2006: 211).

In the lead-up to Papua New Guinea independence in 1975, the Pangu Pati Policy Statement (Jinks, Biskup and Nelson 1973, p.424-426; Doran 2006) included several ideals considered significant for future housing policy:

- Save our land
  Pangu believes that the land belongs to the people of Papua Niugini. If the arguments over land are not straightened out, there will be trouble when we are governing ourselves. Pangu wants an expert committee to look at all problems of land. This committee must find a way to give proper pay for land that has already been taken away and to make better laws and courts for the land.

- Better Housing
  Pangu wants all workers to have houses if they are away from their villages, so that they can have their families with them. The houses for most public servants are poor. Pangu will give them better housing. Pangu wants Papua Niugini workers to own their own houses and will help them to get land and loan money.

- Make villages better places to work in
  Pangu wants the villages to be better places to live so people will not want to go away from them. One way we can do this is to have more training for business and farming in the village. Another way is to bring roads and electricity to the village.

Assessing the National Goals prior to independence, Kari (2008: 70) points to the village community as a powerful and important social unit and a central concept in anthropological research. Yet he concludes that leaders and politicians failed to embrace the vision to create an egalitarian, self-reliant society, neither implementing the ideas nor translating them into policy. At the village level, and indeed the settlements caused by growing migration to the cities,

housing was sub-standard at best, and the people trapped in a cycle of dependency, reliant on external aid (Woolford 1976).

The Australian Department of Native Affairs and the New Guinea Research Unit, at the time of the 1961 Census, conducted a count of the indigenous population of Port Moresby to estimate future housing needs. Subsequently, in preparation for the 1970 Port Moresby Urban Development Study, an assessment of housing conditions and the interrelationship between social, economic and administrative factors was undertaken. It confirmed the negative impact that administrative organisations, though well intentioned, can have (Oram 1965; Langmore and Oram 1970). Administrators of urban development in PNG at Independence generally held the view that Port Moresby was an Australian town with fringe areas of low-standard indigenous housing that would eventually disappear. *'Some Papua New Guinean leaders have also tended to adopt an ultra-Western view of urban development, partly for reasons of prestige.'* (Oram 1976: xii). Instead the flow of migrants increased, with many wanting to join the melting pot of those lingering in the city.

When studying the urban drift of villagers from the East Sepik Province, for example, Curtain (1978: 1) cited anthropologist Keith Hart.

> *[of urban drift] several explanations are adduced: the influence of western ideas on youth, the attraction of 'city lights', the urban wage rate, population pressure on the land, the restrictions of village life, improved road transport and the expanded horizons of the rural masses. There is an element of truth in all this, but the fundamental truth is more unpalatable than any of these piecemeal interpretations. It is simply that the benefits of development are so overwhelmingly concentrated in the urban, white enclave, that the indigenous, rural population is inexorably drawn, at an ever accelerating rate, to seek a share of this prosperity. (Hart 1974: 10-11).*

Around the same time, Strathern (1975) undertook a study of Hagen migrants in Port Moresby and found that the village values were prominent, but being an urbanite held its own appeal in terms of personal freedoms and the ideology of independence. Nonetheless, the first port of call on reaching town was a *'wantok'*[23] with a makeshift shelter.

[23] '*Wantok'*: translated literally in its most simple sense it means of 'One Talk', that of a single language group. Strathern (1975) says that figuratively it means someone with whom a relationship is claimed on a categorical or group basis. In the contemporary context the boundaries of these relationships have become somewhat indeterminate.

It was becoming increasingly evident that in urban villages and settlements there was a preference for mono-ethnic clusters that provided for personal security and comfort in areas with a reputation for squalid living conditions. These were exacerbated by the lack of water, sewerage and rubbish collection services provided by the Australian Administration in the hope of discouraging further rural-urban migration (Levine and Levine 1979).

> *The visual impact is typically that of a collection of rough plank sheds or 'native' material huts, with roofs made of corrugated metal scraps held down with a few large stones. They are laid out in no apparent pattern – certainly not in the orderly rows which expatriates seem to appreciate (Levine and Levine 1979: 41)*

When reporting on urban housing policy shortly after Independence, Stretton (1979) confirms that long-term migration to cities was actively discouraged, due to an inherited policy of providing housing only for single indentured labourers who were forced to return to their villages of origin. These labourers had thus been housed in single men's quarters and family housing was not made available. Nonetheless, the policy created an environment of employer-subsidised housing for both indentured labourers, and expatriate or Government employees which was economically unsustainable for the growing urban population. It was also not available in villages or settlements, resulting in a stratified housing market.

Moreover, although a National Housing Commission (NHC) was established, the policy requirement for the NHC to hold a lease over any land to be provided with improved services meant that traditional owners were unwilling to participate in the schemes available. Self-help houses in informal settlements and urban villages, without any government assistance, therefore became the norm for those migrants who chose to remain in the cities, and in terms of policy, was actively advocated (Norwood 1979; Stretton 1979). Despite this there was recognition of strong links between urban migrants and their villages, particularly among low income earners who had a stronger preference for living in homogeneous settlements where they could rely on the economic and social support of their urban kin.

Umezaki and Ohtsuka (2003: 22) later noted that migrants from the Southern Highlands maintained an informal safety net of rural-urban social norms, settling in close proximity to migrants from the same area, thus deducing that *'the close relationship between urban and rural areas will be a critical concept in harmonious development in PNG and other Pacific countries.'*

In summary, the foregoing historical overview provides context to housing transformation and the drivers of increased urbanisation in contemporary PNG through review of the international literature regarding houses in villages and village-like settlements. It contributes towards fulfilling the second research aim; *to identify and analyse changes in housing typologies in PNG villages with the objective of recognising patterns of existing and emerging house types*.

2.6 DEFINING TRADITIONAL ARCHITECTURE IN PNG

Papua New Guinean traditional architecture was classifiable into broad categories consisting largely of ephemeral thatched and woven structures including round, long, bowed and post-and-beam forms (Seligman 1910; Williams 1924; Hogbin 1951; Loupis 1984). Within these broad groups, individual style and materiality varied, despite at least 400 years of Hiri[24] trading, more than 1200 years of earlier trading patterns, and sustained contact with colonial enterprise. Regional styles remained distinct, while village architectures maintained individual cultural forms and practices that reflected the geographic environments in which they lived prior to colonisation (Hogbin 1951; Maher 1961; Langmore and Oram 1970; Maher 1984). In terms of the two villages surveyed for this research, the architecture of the southern coast and that of the Western Highlands is most relevant and thus described in more detail.

2.6.1 Southcoast Marine Villages

Historical information indicates that the Motu peoples living along the coast from Manumanu to Gabagaba (now within the National Capital District) and other PNG coastal communities, often built their houses on stilts in the sea to guard against surprise attacks from inland tribes (Murray 1912). The largest villages rarely had more than one thousand inhabitants.

'*Short wooden pile jetties extended over the water with five or six dwelling units on either side. Each cluster houses a patrilineal kinship group*' (Oliver 1997: 1186). The Motu houses described by Oliver (1997) were arranged in pairs of lines called *'iduhu'*[25] that radiated out from the shore. A view identified as Hanuabada in 1890 is shown in *Figure 2.9*.

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[24] Hiri trading expeditions occurred annually when Motu ceramic pot manufacturers journeyed in fleets of sailing canoes to coastal villages on the Gulf of Papua. Formal trade for sago and other food items was between long-standing and often hereditary trading partners with reciprocal rights. These villages also served as redistribution centres for inland villages of nearby river systems and those further along the coast (Belshaw 1957; Oram 1967; Mennis 2014).

[25] Iduhu: in his study of Hanuabada, Belshaw (1957) described the iduhu as one or more lines of houses built at an angle over the sea, belonging to people who identified themselves by the same group name. The basis of the iduhu is by patrilineal decent, but if there is sufficient reason a new branch could be established. Space in the iduhu was carefully allocated so that senior members occupied the house closest to the shore.

Figure 2.9. Old View of Hanuabada ca 1890.
Source: Lawes (1890b), Courtesy of Macleay Museum, University of Sydney (HP87.1.117)
Houses were constructed using available traditional materials such as thatch. Built out over the sea, they were close to cultivated gardens above the water line.

Belshaw (1957) described the houses as practical and commodious, with a rectangular plan, a straight gable roof and a front verandah. Any extensions to the line were made further seaward, or a new line established parallel to the existing one. Spatially and physically expansion could not take place between two lines. A decline in lineage membership on the other hand meant a break in the line, and the house would decay. To some extent the walkway lines[26] are still in evidence, loosely based around clan associations not unlike those observed by this author during this research fieldwork at Tubusereia.

2.6.2 Western Highland Village Architecture

Architecture in the New Guinea Highlands by contrast was based on a language group system, with each language group divided into tribes of about two to three hundred people,

[26] Walkway lines: pathways raised above the waterline for access between the stilt houses, linking the dwellings to land in a somewhat similar function to jetties. Usually built of timber planks supported on timber posts driven into the seabed.

living in hamlets which Williams (1937: 90) likened to *'primitive garden cities'* consisting of scattered homesteads with fenced gardens interspersed with groves of trees.

> *There is no doubt that the Mt Hagen 'natives' are well endowed with the aesthetic sense, and it finds further expression in their building. I have not seen anything more workmanlike than their houses, some oblong with rounded edges and some circular. We examined a men's house of the latter type, at the end of one of the dancing grounds […] the roof was heavily thatched with grass and the edge neatly trimmed. The wall was made of bark sheets supported inside and out by spaced uprights of adzed timber (Williams 1937: 93-94).*

Each house was occupied by a single family except in areas where men slept and spent most time in joint accommodation, from which women were excluded. Houses were generally located in defensively strategic positions with a good view of the surrounding area. Sleeping was on a raised platform covered with woven mats and cooking was generally done indoors (Chinnery 1934; Williams 1937). Houses varied from round thatched huts to gable-roofed structures constructed entirely from materials gathered from the bush (Clarke 1971) similar to those in *Figure 2.10*. Design was dependent on the elements the house needed to withstand (Williams 1937; Loupis 1984); cold evenings and persistent rainfall.

Figure 2.10. Cluster of Houses in a village, Western Highlands Province ca 1960s.
Source: Cook and Cook (1961-1963b) Courtesy of UC San Diego. Edwin Cook Papers. MSS 0187.

Ross (1936) similarly noted that the Mogei of Mt Hagen lived in individual houses near their gardens, gathered in groups of between five and forty houses, in no specific formation. Unlike those described by Williams, the Mogei houses of 1937 were rectilinear in shape with the occasional round house. In the Central Highlands in the Simbai Valley, Clarke (1971) describes the houses as '*low shaggy, brown humps – but each has individual features […] The front of the house is straight, the back rounded. Every house has at least one hearth, a circle of rocks around a depression'* Clarke (1971: 103-04).

The empirical evidence of this study shows that conditions are much the same in the contemporary Highland village case study, although distinct influences of modernisation are evident and enthusiastically embraced. When considering the prehistory of the Highlands, Feil (1986: 633) contends that divergent lines of development which extend thousands of years in prehistory are evidence of a long, gradual process of cultural change.

2.6.3 The Process of Transformation

Change was inevitable once Government implemented labour recruitment from the Gulf District, which is thought to have started as early as 1913 for the Vailala oil fields, plantations, and the Public Works Department in Port Moresby (Maher 1961). These contracts were generally between one and three years; they brought the Papuans into sustained contact with European culture as well as men from other, sometime hostile, clans outside their tribal areas and initiated an exodus of able-bodied men capable of building and maintaining housing.

By the 1940s contract labour had become part of life for most of the young males, contributing to the continuing drift away from village life and the effective decline of traditional architecture (Maher 1961; Fowler 2004). The absence of men from the villages accelerated during WWII and changed the settlement patterns from that of autonomous villages clustered into small groups, to one of complexes of two or three villages, with some houses built along, what appeared to be, similar lines to European houses. Maher (1961), suggested that the suppression of cannibalism and exposure to new ideas and opportunities after WWII sparked a rejection of old ways and a turning toward the new on a mass scale.

Woolford (1976: 4) on the other hand contends that the change of Government in Australia and the resultant change of PNG Administrative attitude to the more egalitarian

direction of Cleland[27] encouraged a desire for new urban ways of living. The Australian Administration did not anticipate the massive rural to urban migration that occurred during the 1950s. Forced by increasing pressure from the United Nations to address this issue (Doran 2007), it provided limited housing, away from the expatriate enclaves and implemented the rapid rollout of European prefabricated designs, sourced from as far afield as the UK.[28] Although the traditional vernacular architecture was rich and complex, it was typically disregarded (Costigan 2014; Addison 2015).

2.6.4 Low Cost No Cost

By the 1950s, urban villages and settlements had mushroomed, as had the rural population (Belshaw 1957; Jones 2012b). With 95-96% living in rural areas, and most indigenous workers in urban areas earning less than AUD10.00 a week[29] (Doran 2006), it became obvious that there was an urgent need for affordable accommodation. Inevitably, affordable came to mean low cost which in turn meant a reduction in size and quality (PNG Department of Public Works 1968; Vulker et al. 1990; Hall 2015). This was exacerbated by complex and often disputed land tenure arrangements both within tribal areas and also between traditionally warring neighbouring clans (Kiki 1968; Weiner 2002).

Several housing provision models were nevertheless experimented with in major towns, like Port Moresby, but by 1965 it was clear that most of the indigenous population could not afford to rent the houses funded by the Administration. The size of a family home was reduced to 12ft x 10ft (3.6m x 3.0m) and 105 were built, but this experiment rapidly resulted in overcrowding and was soon abandoned (Langmore and Oram 1970).

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[27] In 1951 the Prime Minister, Robert Menzies appointed Hasluck as Minister for Territories. This gave him responsibility for Australia's colonial possession, Papua New Guinea. Donald Cleland became administrator and chaired the Legislative Council of the Territory of Papua and New Guinea (which became Papua New Guinea) from 1953 until 1964 (Cleland 1960).

[28] An example was the Hawksley house: a prefabricated aluminium house constructed by AW Hawksley Ltd. England, based on designs from Sweden. At Mosman, NSW one of a series of 14 prefabricated houses for use in various regions of Australia and New Guinea is listed by Do.co_mo.mo (a non-profit organization: full title is International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement) as significant for technical, social, cultural and aesthetic reasons. The house was known as 'Housing for Commonwealth Employees: 3 Bedroom Type' and its drawing of origin was listed as HA1497. In the same series of drawings of prefabricated houses was the Riley-Newsum CA1 (drawing of origin ACT19750) and the Åmåls Sågverks Aktiebolag (drawing of origin A5493).

[29] In the 1950s the average pay for local Public Service Officers and graduate students for example was 35% to 40% that of Overseas Officers, yet still substantially more than unqualified indigenes, contributing to civil unrest (Doran, 2006).

Anderson and Hogg (1969) provide a photographic record of PNG in 1968-1969, charting the introduction of indigenous participation in politics, religion, education and a monetary economy to facilitate movement towards eventual self-determination, with textual references regarding the social impact of overcoming centuries old customs and allegiances in a rapidly changing world. Similarly many anthropologists, economists and agriculturalists working to evaluate development policies that would benefit rural areas were documenting the social transformation, some of which related to the gradual move away from traditional housing (Hogbin 1951; Essai 1961; Oram 1965; Oram 1966; Hitchcock and Oram 1967; Salisbury 1970; Strathern 1975). There was however a great disparity between the political manoeuvring in the main towns such as Port Moresby and the many isolated coastal and highland villages where people were fearful of such rapid development (Woolford 1976; Sinclair 2016). A broad-brush view of the architectural evolution in PNG, since European contact, is shown in *Figure 2.11*.

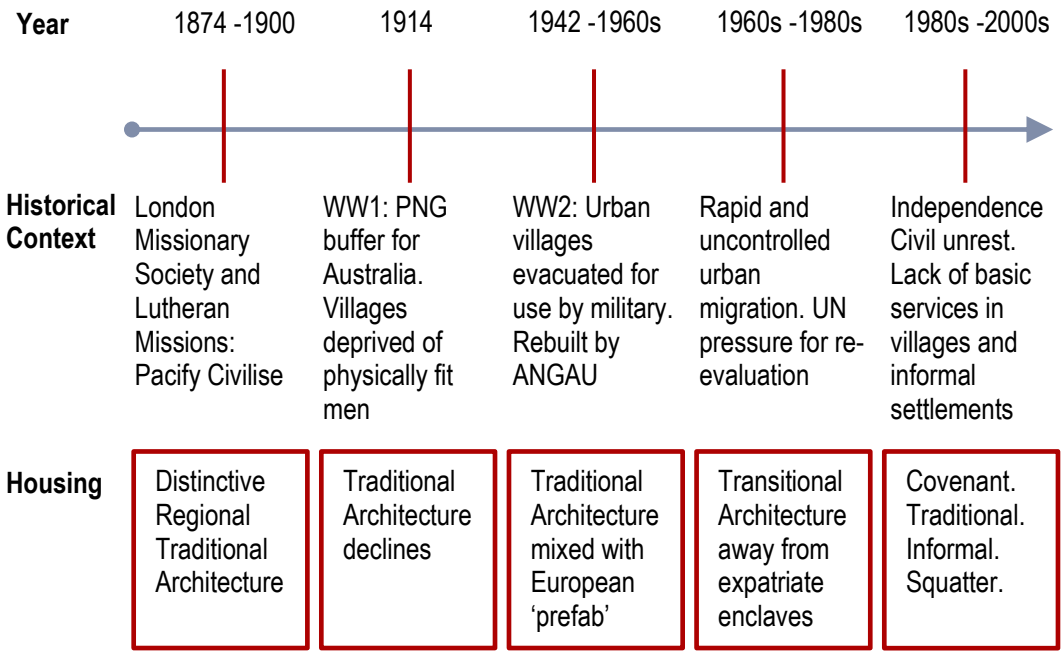

Figure 2.11. Architectural Evolution Background Context.
By author. Compiled from literature: (Jinks, Biskup and Nelson 1973; Doran 2007).

In contrast to most Highlands New Guineans still living tribally, a transitional group of urban Papua New Guineans, educated and accustomed to the European ways were, by 1967, moving away from their villages and losing contact with customs, tradition, and subsistence living. They were positioning themselves to be the dissidents and future political leaders of an independent PNG, free from the perceived colonial yoke of Australia. Anderson and Hogg (1969) describe their view of this transitional person:

> *He has changed his wild pork and kau for bully beef and rice, his spear and arrows for pen or steering wheel. The village life is now behind him. He would no longer be happy in a grass hut; he has changed that for a building of sawn timber and corrugated iron; a shanty perhaps, and not to be compared with a white man's house, but close to town where there's money to earn and exciting new things to do […] but he knows there is no going back. He has turned the corner, cut himself off from his brothers in the jungle; he can only go on (Anderson and Hogg 1969: 111).*

Social tensions, economic development issues and concern about the preservation of the environment, culture, and history, were already prevalent throughout PNG in 1968. A Government submission to Canberra in May 1969 noted the main problem areas to be overcrowding[30], poor sanitation, a breakdown in village life, family break-up caused by employment practices, and *'sub-human'* housing conditions that were more obvious in the towns and settlements (Doran 2006: 769). Observation worldwide has shown that extremely poor-quality housing inevitably materialises, either on the outskirts of cities or in *'vacant'* pockets of tribal land, as rural people flock to cities (Hundloe 2015). In PNG, the villagers such as those in Hanuabada are no better housed on their customary lands and waterways than those in squatter settlements.

> *Today the (community) tap comes on at 7am and stops at 9am. For the whole day, there is no water. At 5pm the tap comes back on again and stops at 7pm. The taps in the houses gather rust from want of use. The single tap at the front of every clan bridge dutifully assumes its role as the centre of the social circle, the social water cycle. Near the tap, children play, scantily clad people with bath-towels wait turns to have a wash, mothers sell betel nut and cigarettes and cans of imported Pepsi. All around the tap there is rubbish and mud. The place is a slum, a bogged-out slum. Every morning and afternoon, I am up to my toes in the mud and rot halo that overlays the earth around the tap, fetching water with my siblings (Vada 2015).* [31]

[30] An estimated 30,000 squatters.

[31] Vada notes that not far from the tap is the site of the first Court House in PNG. The location of the Union Jack signifying British dominion over Papua New Guinea more than a hundred years ago and the site of Sir Hubert Murray's State Funeral (the Administrator of the Australian Territory of Papua, prior to independence), are close by. It was furthermore a key strategic area for the Allies during the Pacific War.

The land on which Port Moresby sits was traditional cultivation land for Hanuabada clans, now it is a wealthy enclave, with running water, security, and power, financially and socially unavailable to most of the indigenous population.

Of an estimated 500,000 - 750,000 people in Port Moresby (World Bank Group 2014b), about 45% live on the city's periphery and are generally not included in official census figures. Similarly, in Lae, an estimated 50% of the population (Brinkhoff 2014) live on the periphery (World Bank Group 2014b). Many contemporary villagers still collect water in buckets at the communal tap and bathe in the open air, while living in overcrowded houses and competing for limited jobs (Moi 2012).

It can be confronting to visit *'modern'* villages or settlements because overcrowding and diminished resources have resulted in unprecedented cultural and social decline. Moreover, an assault on the senses is inescapable; the smell of putrefying garbage, sun scorched under the humid sky, the pit-latrines and over-the-sea toilets, the smoke from the wood fires or kerosene stoves. The visual impact of injuries resulting from domestic violence, crime, and limited health services, are things that can be appreciated fully only by personal observation. As they spread out, hugging the shoreline or the mountains, part of but distinctly separated from the formal towns and cities that have overtaken them, what urban villages and settlements all have in common is social stigma; the social structure, like that of the roads is tattered, cracked, and neglected. One such settlement was Paga Hill (*Figure 2.12*).

Oram (1965)[32] had tried to bring attention to the problems that lack of planning would create in the settlements mushrooming on the periphery of Port Moresby as early as the 1960s, as did others who followed. See for example Strathern (1975); Levine and Levine (1979); Stretton (1979); Morauta (1984); Goddard (2001).

[32] Nigel Oram: academic, ethnologist and anthropologist specializing in the Pacific and New Guinea. He helped establish the ANU New Guinea Research Unit in 1962 and was consultant on urban local government to the South Pacific Commission in 1964. The New Guinea Research Unit, part of the Research School of Pacific Studies, began operations in 1961 with a small group of support staff and academics located in Canberra and New Guinea. The Unit fostered interdisciplinary work on New Guinea among ANU academics. Along with Dr. Ron Vanderwal (archaeologist), he established the Prehistory department at La Trobe University in 1976 and the Chair in Prehistory in 1980 (ASAO 1976: 15).

Figure 2.12. Paga Hill Settlement prior to resettlement program.
Source: Sokhin (2013b).

Paga Hill was the former base of Australia's World War II defence of Port Moresby. Remnants of one of the gun emplacements is shown in *Figure 2.13*.

Figure 2.13. Paga Hill gun emplacement 1968.
Source: Nashos (2011).

Paga Hill had been settled by customary landowners who occupied the abandoned wartime bunkers to create makeshift homes in the decades after 1945 (*Figure 2.14*).

Figure 2.14. Paga Hill Settlement at gun emplacements 2011.
Source: Booth (2011) The round track around the empty pit was used for a 360 degree six-inch machine gun during WWII.

Controversially the settlers were evicted between 2012 and 2014 and the settlement later razed to make way for a luxury, gated waterfront estate (still not completed at the time of writing) amid calls for an enquiry into the legality of the deal. An example of the concept design for the Paga Hill development is shown in *Figure 2.15*.

Figure 2.15. Paga Hill Development Concept, 2017.
Source: One PNG News Online (2017)

Some settlers have since been relocated to areas on the outskirts of Port Moresby, however at the time of writing the legality of the evictions were still being pursued by the former Paga Hill residents through the International State Crime Initiative (Lasslett 2012) and the UN Human Rights Council (Graue 2019). Despite the stigma that is attached to living in settlements

and urban villages, these tend to be strong communities, notably resilient because they have had to be; having had to adapt to an informal integration of sorts despite the poverty and lack of basic services, in order to overcome a post-colonial malaise that is common after independence (Austen 2006; Maurer 2014).

Based on the conditions described here, a primary goal of this research was to identify a better way of providing housing for the large PNG population that is gradually, but undoubtedly, moving away from traditional village lifestyles and housing, into what could be termed '*transitional housing*'. Hence it is necessary to find out how the transition away from traditional architecture occurs. A fusing of major conventional disciplines, drawing upon history, urban design, geography (both physical and human), and elements of anthropology and ethnography was indispensable.

As noted in Tanim Graun (2014), de-housing 3000 people to build 200 villas is elite development and is the wrong kind of housing under the circumstances. It is dehumanising to classify people as workers or squatters and is not conducive to building communities (Tanim Graun 2014). Connell and Keen (2018) seem similarly critical:

> *Policy and practice remain mostly focused on removing urban blights whether 'illegal' markets, settlements, betel nut spitting and drinking residents, or loitering youths. Prestigious urban locations especially are still the abodes of the affluent with those less wealthy pushed to the outskirts, evident in 2012 with the bulldozing of settler residences at Paga Point, Port Moresby, with minimal compensation and without resettlement options, to make way for a gated residential, tourism and casino precinct (Connell and Keen 2018).*

More recently, George (2017) reported that since Independence the National Housing Commission has been for public servants, with no provision for the public, private or informal sectors, and that despite the influx of migrants there was still nowhere to house them nor any security of land tenure. As a result, village-like settlements have developed and flourished but are acknowledged as lacking in basic infrastructure and services because they fall outside the formal urban planning context.

> *The government is prioritising for infrastructure development in and around the city but has this helped improve the situation and living condition of the people? The majority of us are living like animals and we need to wake up and stop accepting this (Kilage, interviewed by George 2017).*

Arguably the PNG housing sector is still in crisis (Goddard 2001; Storey 2010; Connell 2011; Jones 2012b; Tanim Graun 2014).

2.7 RELATED KEY DISCIPLINES

2.7.1 History, Geography and Development Economics

> *History exists so long as an object is in use; that is, so long as a form relates to its original function. However, when form and function are severed, and only form remains vital, history shifts into the realm of memory. When history ends, memory begins. History comes to be known through the relationship between a collective memory of events, the singularity of place (Locus solus), and the sign of the place as expressed in form (Rossi 1982: 7).*

Understanding the history of the peoples of PNG, both pre-colonial and post-colonial, is essential if subscribing to the concept of *'path dependence'* (Hundloe 2015). In other words, actions of the past have a strong bearing on the present and the future, unless another future can be conceptualised and crafted. It explains how a particular sequence of events can constrain future options (Slagter 2004). The concept of path dependence has more recently been applied to historical research, although originally developed for economics, and is useful for considering causal factors and causal processes (Blatter 2008). This thesis is not one of historical research *per se* but draws on the work of historians, with additional original research undertaken. Historical data provided a longitudinal aspect to the research for depth and context.

Physical geography needs consideration in any built environment research. Culture, climate, terrain, and ecosystems have determined how the PNG peoples lived, what they ate and what shelters they built. Human geography, in terms of human settlements and what the United Nations calls *'habitat'*[33], is also a key to understanding what housing exists and what the options are for the future (UN Habitat 2003). Human geography has strong links to what people do and what they can afford on a spatial scale. The broad periods discussed *'represent the widespread adoption of new ways of life (perhaps cultural revolutions) that may have erased the previous cultures. But understanding the past may help understand the present'* (Hope and Haberle 2005: 541). Interwoven with environment and related cultural and economic factors, is the broader concept of development.

[33] UN Habitat: housing should be defined in terms of the dwelling environment and not the dwelling structures. The value is in the relationship between man and environment, not simply the physical conditions.

PNG peoples practised an ideal form of communism Narokobi (1983) suggests, which worked well and subsequently determined the way that they adapted to life in colonial and post-colonial society. Lindstrom (1992: 15) presents an alternative narrative, suggesting that this is an idealised, construction of shared culture that ignores some of the less equitable aspects of traditional life: traditional warfare, polygamy, payback killings, sorcery, and the valorisation of 'big men'.

Read (1954: 6), referring to the Chimbu of the Central Highlands of PNG, described 'big men' as flamboyant and physically aggressive orators. In the absence of hereditary leadership structures, claims to authority rely on warrior prowess, oratorical skills and wealth, which in turn provide the framework for political alliances based on kinship and direct cooperation. The power of authority however was generally also held by older men through years of accumulating wealth credits based on ceremonial exchange, the development of leadership skills and traditional knowledge structures, and the ability to settle disputes (Strathern 1966; Clarke 1971: 32; Dalton 1979; Brown 2009: 5).

Nonetheless, when considering change in the balance of power, Dalton (1979) suggests that 'western-style' education and the accumulation of cash by younger men have led to the erosion of older men's authority. His studies of the Chimbu, for example, also indicated that the traditional 'big man' means of rising to positions of authority, when applied to multi-cultural urban development, can lead to nepotism (Dalton 1979: 100-02), or in the hands of younger, inexperienced men, exploitation (Brown 2009: 11) and despotism (Salisbury 1964).

May (1997) suggests that simplistic versions of the 'big man' model requires qualification because leadership structures in PNG existed within the whole gamut from communalism to despotism. Similarly Hau'ofa (1981) takes a more circumspect view, including areas outside the Highlands and states:

> *Instead of persisting with the assumption that achievement is the defining characteristic of Melanesian leadership, we could more profitably adopt the view that leadership structures in the region manifesting all degrees of relative ascription and relative achievement. On this basis we can hope to attain a greater appreciation of the complexity and variety of Melanesian systems (Hau'ofa 1981: 292-93).*

Observation during this research shows that, at least in the Highlands field area, 'big men' with strong oratory and persuasive skills still hold sway at the village level. However, monetary

wealth in return for their official roles as Councillors has not transpired, and any influence is limited to their individual following and thus as fragmented as it was prior to colonisation.

As Ketan (2013: 5) more critically noted, the classic big-man model in the Highlands that was traditionally effective in good governance has been eroded by '*their modern counterparts (parliamentarians)*' for whom service delivery is no longer a priority. Martin (2019) posits that the shift in power away from *big men* to the political elite is a phenomenon of social change, noting that they are unfavourably perceived by '*a growing stratum of impoverished grassroots villagers [as] the so-called 'big shot*' (Martin 2019: 379).

Consideration of development economics is necessary, not because it describes the path that PNG has taken, it clearly does not, but because it colours the thinking of western intellectuals and hence how they attempt to influence development, and thereby may influence decisions related to habitat. Human geography helps explain any disconnect between values and norms and the events that may have contributed to change over time, including the impact of colonial expansion.

2.7.2 Anthropology and Cultural Change

> *Every animate being, as it threads its way through and among the ways of every other, must perforce improvise a passage, and in doing so it lays another line […] knots are places where many lines of becoming are drawing together. Yet every line overtakes the knot in which it is tied. Its end is always loose, somewhere beyond the knot, where it is groping towards and entanglement with other lines, in other knots. What is life, indeed, if not a proliferation of loose ends! (Ingold 2013: 132).*

Research involving cultural studies grounded in anthropology needs to be considered in the context of the schisms that developed in the discipline not only between British and American anthropologist but also the differing perceptions within sub-disciplines that resulted; more so in the 1960s. Broadly, ideological differences emphasised anthropology as either a social science discipline, or alternatively, a humanities discipline. Older perspectives like functionalism were largely relegated to history by the 1960s, as a new paradigm based in the humanities was emerging which would eventually lead to significant divisions within anthropology and across the social sciences. Humanities favoured a concept of culture involving ideas, symbols, and meanings, as opposed to the concept of social systems that focused on behaviour and social structure (Shankman 2017: 49).

Within the social sciences, as Caldararo (2004: 312-13) points out, the virtues of quantitative empiricism were extolled, while the dangers of theoretical speculation, especially those claiming to produce 'grand theory' were warned against. Lewis (1998: 724) contends that there was a tendency to refer to the work of more famous anthropologists such as Malinowski, Levi-Straus, Mead and Geertz, without understanding their theoretical positions or the range of variation in their ideas and corpus of work. Nevertheless, in Melanesia Belshaw (1957), Hogbin (1951), Maher (1961), and Salisbury (1970), among others, wrote about cultural change in terms of social systems (Lewis 1998).

Richard Salisbury's work is among the authoritative anthropological texts recognised globally (Salisbury 1970; 2004b; 2004a). He spent considerable time in Papua New Guinea as an economic and applied anthropologist, and was concerned about advancement, economic change, and conditions that support indigenous, self-sustained development (Silverman 2004). Salisbury was part of a growing group of academics who, regardless of discipline, were aware of the complexity of traditional societies and thus the limitations that a single mode of research offered. Salisbury embraced the challenges of unfolding facts, by including statistical data in his analyses (Salisbury 2004a).

Similarly, Wolf followed a systematic form of enquiry, seeking analytic understanding by grounding theoretical discussions in cases, and in observed behaviour, especially in relation to structural power.

> *It is not the events of history we are after, but the processes that underlie and shape such events. By doing so we can visualise them in the stream of their development, unfolding from a time when they were absent or incipient, to when they become encompassing and general. We may then raise questions about proximate causation and contributory circumstances, as well as about the forces impelling the processes toward culmination or decline (Wolf 1999).*

Eric Wolf favoured an anthropology that considered historical and contemporary interactions, and addressed the complexity and fluidity of power and inequality in societies (Wolf, Silverman and Yengoyan 2001). He focused particularly on the impact of colonial capitalism on indigenous cultures, and more specifically on case studies of '*peasant'* societies in Latin America and Europe. He was concerned at the (then) contemporary practice of viewing tribal societies as existing within a timeless present, unaffected by the outside world (Wolf, Silverman and Yengoyan 2001: 310). His view was that no society could be considered static

and more particularly so those without their own written histories which were subsumed by colonial economic expansion, including the imperial colonial and post-colonial experience of PNG. Wolf argued that interaction between local communities and larger forces should play a key part in anthropological analyses (Wolf 1999). Although Europe was the main focus of Wolf's studies, his theory that diversity exists in time and space and in relation to key social variables such as process and political economy, is transferrable (Kottak 2012).

Although early anthropological studies in the PNG Highlands (1930s) were largely abandoned due to difficult field conditions, tribal warfare and the interruption of WWII, Scaglion (2001: 146) notes there was a resurgence of sustained and intensive research in the Highlands in the early 1950s that he describes as '*a swarm*'. The 1960s and 1970s saw research attention turn to the Sepik, and after Independence a change of direction to consider the broader brush of regional variation and integration. Through Soukup (2010) maintains that the discipline of anthropology is particularly linked to Papua New Guinea where it has been shaped as a holistic science of man and culture.

In architecture, more recently the theory of environment-behaviour studies has been incorporated as a theoretical framework to capture the cross-cultural diversity of behaviours, values, customs and meanings associated with built environments (Memmott and Davidson 2008a)

2.8 EURO-AUSTRALIAN ARCHITECTURAL INFLUENCE: COLONISATION

Government-standard production systems, introduced by the Public Works Department in the 1960s (PNG Department of Public Works 1968) became the dominant choice by the late 1970s (Week 2000; Addison 2015; Hall 2015). Prejudice against the validity of traditional construction methods and materials prevailed.

In the late 20th century, recognition of the importance of traditional design in PNG, led Week and Costigan (Week 1987; 2000) to develop architecture for PNG that incorporated an evolving culture, the climate, resources and the dual economy[34]. Their work encouraged training programs, material production and the development of innovative construction management in

[34] Papua New Guinea has a dual economy comprising a formal, corporate-based sector and a large informal sector where subsistence farming accounts for the bulk of economic activity. Curtain (1980: 43) says this is a consequence of the Migrant Labour System established in PNG by colonial administrations, both German and Australian, whereby the single migrant labourer engaged as cheap labour in the cities requires continued support from his family in the village because he has no legal or political status at his place of work.

order to create an architecture accessible to all, concentrating pragmatically on financial, cultural and physical needs drawn from traditional building methods and materials. Narokobi (2009), following an interview with Costigan, surmised that their design solutions reflected an understanding of local cultural priorities. Despite this, the success of their efforts and design philosophy has not translated into wider policy frameworks. That is, there has not been recognition or implementation of their contribution by policy makers and planners.

> *We became fascinated with their material resources; they became fascinated with ours. Our cultures sailed past each other, gazes fixed on different horizons. (Week 2000: 304).*

In dealing with the issue of technological control and alienation, Week and Costigan had sought a simple methodology, developed through iterative processes. The repercussion was that it closed them off to a large proportion of people who held a different view of advancement.

Week (2000) proposed that Western construction management fails to acknowledge a pre-existing society capable of creating complex, finely crafted buildings suited to their needs. Western procurement methods and contractual requirements also often exclude locals from producing their own buildings (Week 2000; Tanim Graun 2014). Since finance and measurable results link to most development aid, there is not much room for local capacity building, despite overt best intentions (PNG Government 2007; Jones 2012a). The infiltration of Western architectural practices in PNG since the colonial era, Week (2000) maintained, contributed to the displacement of local traditional architecture through governmental, educational and commercial means. He posits that imposition of Western architectural practices on developing countries, without consideration or understanding of the specific needs or desires of those cultures, requires a change in direction to avoid either elevating or denigrating traditional architecture (Week 2000).

Critical of Western researchers' understanding of the link between the built environment and user-occupants in Melanesian settlements, Gonduan (2000) stated that these studies were limited to physical and artistic illustrations and did not address the underlying cultural inter-relationships. He notes that the Coiffier (1985) study of rural and urban settlement patterns among the Iatmul of the Sepik region, for example, pays little attention to the domestic dwelling. Gonduan does, however, acknowledge the pioneering contribution to documenting social and

cultural anthropological development made by Bateson (1958)[35] and more recent contributions to vernacular architecture from Holden (2004) and Costigan (1995), both involved in architectural research through the Village Studies Program at Lae University of Technology. Grey (1979), whose work encompasses Chuave architecture of the Highlands, was also part of the Village Studies group described in Section 2.10.

In the setting of earlier times, recording and attempting to understand what was to Western researchers completely alien, has in the intervening years been informed by expanded research methods and a more reflective, encompassing approach. Rather than overlooking and undervaluing traditional principles of designing and developing liveable environments, that Gonduan asserted is the Western architectural preference, it can be argued that the problem of transitional housing is the lack of dialogue regarding dwelling philosophy and the inclusion of tradition in the design process. A two-way collaboration of ideologies is required to overcome the divergence between habitable design solutions and pragmatic political will.

2.9 SEEKING PATHWAYS FOR CHANGE

> *Architecture is constructed to meet the needs of people … Social sciences give us some access to how people actually live, what is important to them, and how something as fundamental as identity can be constructed through engagement with the built environment (Lucas 2016: 15).*

If systems are to be established that can, when implemented, mitigate the housing crisis, then simply documenting and comparing is not enough (Goddard 2001; Connell 2002; Jones 2012b; Maddocks 2012). It is necessary to consider how people relate to their homes now, compared to how they related during colonial occupation, in the Village Studies Project, and in the intervening years; what their lifestyle aspirations now are, and whether their homes fulfil these aspirations (J Connell 2015, personal communication, 16 February). Arguably there is justification in seeking a pathway for change.

Concomitant is the problem of urban land tenure in PNG. The post-war migrants from other areas established themselves using their traditional trading relationships and

[35] Bateson is generally acknowledged as questioning the limitations of a purely scientific approach to observation, preferring instead to extrapolate general theories to gain deeper understanding and to work in an interdisciplinary oeuvre that included visual anthropology and ethnographic fieldwork. His most important book, *Naven* (1936), was a study of cultural symbolism and ritual based on fieldwork among the Iatmul people of the Sepik region of Papua New Guinea. Cletus Gonduan based his architectural doctoral thesis on the Iatmul.

arrangements with customary landowners, but these arrangements are tenuous at best, with no legal standing (Goddard 2001; Dovey 2012). When looking at migration to Port Moresby, Lae or other major centres, it is beneficial to determine what settlers see as benefits or otherwise of leaving their villages (Levine and Levine 1979; Goddard 2001; Storey 2010). As Jones (2012b) contends, the boundary between urban and rural villages can no longer be clearly defined, due to shifting perceptions of urbanisation, modernity and economic development.

The escalating growth of urban settlements, dominated by a system of ethnic allegiances, suffers persistent land tenure tensions and disputes. While land in the rural setting is primarily under customary ownership with no written records, that in the urban areas is either freehold, leasehold or customary and used as a commodity, complicated by informal arrangements regarding use and ownership, and rising levels of both rural and urban poverty (Jones 2012a; Jones 2016). Entangled in this urban fabric are inadequate housing policies and vested interests in land development, which have resulted in a rich and eclectic spread of self-help housing initiatives, loosely based on a combination of customary and modern ideals.

> *To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth, transformation of ourselves and the world - and, at the same time, that threatens to destroy everything we have, everything we know, everything we are (Berman 2010: 15).*

This research has generally focused on architectural, anthropological and other studies undertaken in PNG since 1914 (Belshaw 1957; Maher 1961; Salisbury 1970; Strathern 1975; Oram 1976; Feil 1987; Gonduan 2000; Week 2000; Goddard 2001; Fowler 2004; Holden 2004). However, it has conclusively shown that the issue of traditional housing from a built environment perspective, although recently growing in importance, has been a somewhat peripheral research topic, overshadowed by urban planning, social, economic and environmental studies.

2.10 THE VILLAGE STUDIES PROJECT

The Village Studies Project initiated by Neville Quarry at the Lae Institute of Technology, serves as a springboard for this research. Documenting the architecture of all the provinces of PNG, Quarry believed, should take into consideration the architectural, environmental and cultural values of PNG (Holden 2011). He was concerned, at that time, about the lack of information regarding traditional construction methods, materials, and settlement patterns on which to ground architectural education and research at the Institute.

Quarry encouraged an awareness of traditional architecture subsumed by cultural change, and an imperative to document what they could. The work of the Village Studies Project was significantly expanded with the establishment of the Architectural Heritage Centre of Papua New Guinea by Professor Wallace M. Ruff[36] (Austin 2001; Michelson 2005; Holden 2011).

Ruff began his long association with the Department of Architecture and Building at the PNG University of Technology (Unitech) Lae in 1974. Research conducted in collaboration with his wife Ruth, photographs and drawings of villages and ceremonial houses are held at the Architectural Heritage Centre. In 2000, portions of the Ruff Collection physical artifacts were accessioned by the University of Washington's Burke Museum. Scholars of South Pacific vernacular architecture have acknowledged the importance of the Ruffs' early work on the disappearing architecture of PNG (Memmott and Davidson 2008b). Of the buildings recorded by Professor Ruff, 95% have disappeared or been deliberately destroyed without being replaced, leaving the Ruff Collection as the only known recorded knowledge base of these structures (Papua New Guinea University of Technology 2017).

Ken Costigan was one of several Australian graduate architects researching for the Village Studies Project and remained in PNG. Together with David Week, he developed an architecture based on local capacity building and cultural connectivity, drawing on Alexander (1977) for a '*pattern language*'. The other researchers on the project were Adrian Boddy, Tony Styant-Browne, Janet Grey and Gordon Holden (Holden 2011), all renowned in Australian architecture.

In his reflections on participating in the Village Studies Project, Holden (2011) acknowledged that, at that time, architectural research methods and experience were limited. The staff and researchers on the Village Studies Project therefore drew on methods from other disciplines. Specifically, they sought guidance from Margaret Mead (anthropology), Gregory Bateson (cultural anthropology), Herbert Gans, Clare Cooper Marcus (sociology), Bronislaw Malinowski, Ian Hogbin (applied anthropology), Bernard Rudofsky, Paul Oliver (vernacular architecture), and Amos Rapoport (cross-cultural studies). Mead and Cooper-Marcus were particularly influential as visiting lecturers (Holden 2011).

[36] Professor Wallace McAllister Ruff (1912-1999), Graduate student, University of California, Berkeley (UCB); Assistant Professor of Landscape Architecture, Texas A & M University, 1951-1952. Assistant/Associate/Professor of Landscape Architecture, University of Oregon, 1952-1976. His collection and research work in Papua New Guinea began in 1958. Professor "Mack" Ruff was murdered in his home in Lae, PNG in 1999 (Michelson 2005).

2.11 THE CONCEPT OF DEVELOPMENT

Development in PNG, Kulwaum (1995) contends, is constrained by the centralised bureaucracy established through the process of colonisation, that persist in PNG, the consequence of which is a pattern of dependency. In recent times it has extended to international aid and exploitative foreign investment in PNG's natural resources which arguably have become institutionalised. What has become clear is that PNG development policies, including those related to housing, have been defined by the difficulty of reconciling differing interpretations of what development means.

Week (2000) noted that the idea of development emerged relatively recently with the demise of colonialism, and provided an overview of the rise of modern architectural practice, and its context in some developing countries:

> *To develop means, for the undeveloped, sacrificing the natural surroundings, long-standing loyalties, traditional knowledge and customs that gave their lives meaning, in order to embark on a road that others know better, towards a goal that others have reached. For the overwhelming majority of the world's citizens, development has meant not the alleviation of poverty, but rather a devaluation of their own skills, values, and experiences in favour of a growing dependence on guidance and management by bureaucrats, technocrats, educators and development experts (Week 2000: 15).*

This view of development as it relates to PNG has been further discussed by MacWilliam (2013) who suggests that the concept of development as a potential liberating force was an ideal that was never realised.

In his thesis on the Iatmul of the Sepik, Gonduan (2000) provides an overview of shelter provision and questions how resources, skills, social, cultural and economic needs are met. He discusses the development of appropriate design and processes for the physical nature of domestic dwellings for Melanesians moving away from their villages and vernacular architecture into the urban dwelling experience. Gonduan contends that traditional housing needs to be divorced from mainstream architectural theory and cites the Louis Sullivan[37] - Frank Lloyd

[37] In 1896, Louis Sullivan wrote: 'It is the pervading law of all things organic and inorganic, of all things physical and metaphysical, of all things human, and all things super-human, of all true manifestations of the head, of the heart, of the soul, that the life is recognizable in its expression, that form ever follows function.' (Sullivan 1896: 408) Although the quote is most often cited as Sullivan's, he is said to have credited the origin of the concept to Roman architect Vitruvius' *De Architectura.* The origin of the phrase is often, but wrongly, ascribed to Horatio Greenough.

Wright legacy (form follows function; form and function are one) as a failure to recognize that behaviour analysis and environmental psychological responsiveness are key considerations when designing homes. Furthermore, he states that Melanesian shelter needs are integral with social, cultural, economic, and developmental relationships and the continuation of harmonious living is dependent on maintaining this balance. Arguably such a relationship is not limited to the Melanesian context. The true value of architecture in PNG, Gonduan proposes, has been misinterpreted and distorted by researchers who have not understood the depth of meaning and reality of social, cultural, and spiritual significance of communal societies.

The author's discussions with Costigan (2014) and Holden (2014) provide an alternative perspective, indicating that previous studies such as The Village Studies Project were limited by access to, and intimate social knowledge of, the communities documented. They acknowledge the limitations but justify the recording as significant, at a time when Western influence was possibly subsuming domestic vernacular architecture in PNG. Accordingly, due to the accelerated disappearance of traditional dwellings, the process of transition requires a deeper understanding of the complexity of each community, their specific needs, and respect for traditional knowledge as a form of intellectual capital.

Gonduan's focus is on the conceptual and operational use of domestic space of the Iatmul people, to inform future designers and design frameworks. In doing so he shows that the Iatmul people have a highly developed, meaningful, responsive, and expressive building and settlement history from which policy makers and planners can learn (Gonduan 2000). These senses of place are important within the boundaries of this research as they contribute to an alignment of local, national and international built environment initiatives.

Placemaking has become significant as part of a worldwide movement to protect *'place as heritage'* due to concern regarding loss of individuality and distinctiveness between places resulting from cultural globalisation (Lynch 1960; Kearney 1995; Nijman 1999). As results of this research will show however, there is a contradiction between the concept of traditional placemaking as a static ideal, and that of culture as a dynamic construct, which will encourage discourse regarding the meaning of traditional architecture in contemporary PNG.

Frank Lloyd Wright is said to have extended the theory with 'form and function are one' when explaining the theory of organic architecture that became his oeuvre (Wright 1939).

A review of policy regarding settlement and living patterns may better support both provided and self-help housing needs and open avenues of dialogue for adaptation, adjustment, sustainability and ultimately survival of a vibrant, diverse architectural culture (see *Figure 2.16*).

Of specific interest is Gonduan's assertion that the Melanesian transitional dwelling experience from the traditional society into the modern urban society is a *'unique'* experiential encounter (Gonduan 2000: 17). Within the 21st century this may well be true, and his detailed knowledge of PNG society and resultant combination of different methods of data collection and analysis was an important resource for this research.

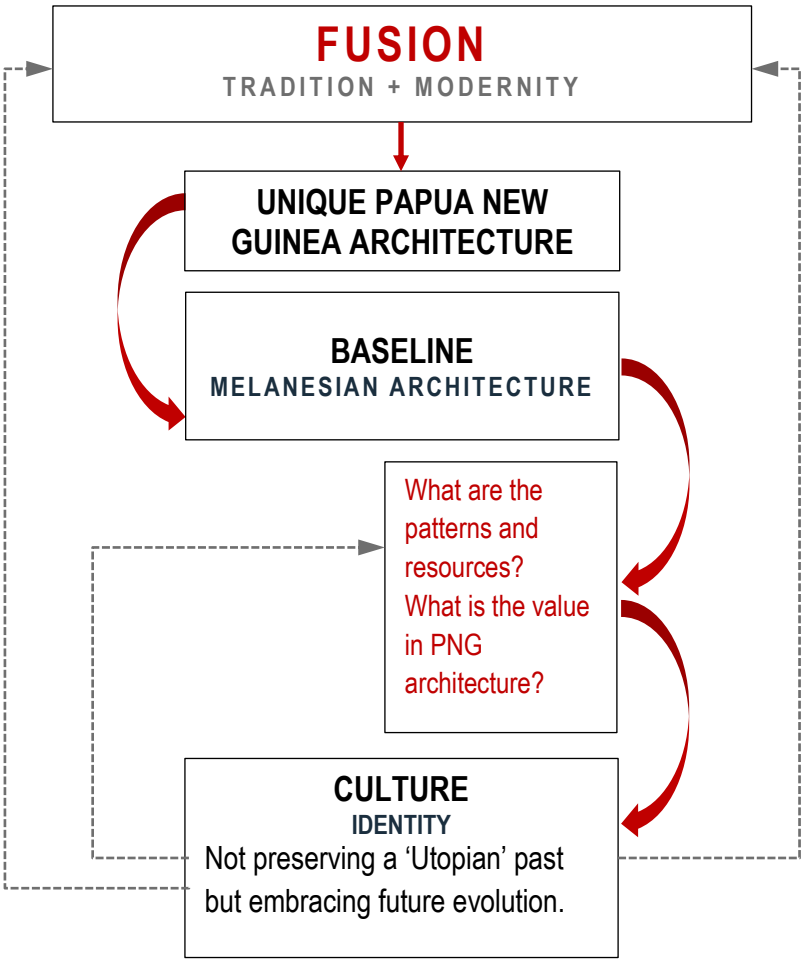

Figure 2.16. Proposed sustainable Melanesian architecture model (by author).

Nevertheless, it is twenty years since the Gonduan (2000) study and, as elsewhere in the world, policy has failed to address the growing rural to urban divide, nor the unsustainable outcomes that lack of effective action brings. As Connell and Keen (2018: 103) point out

'Inaction has led to persistent negative trends, far from any evolution towards meeting the global ideal of sustainable cities.'

Historically, the concept of 'sustainability' entered the public consciousness in the early 20th century renewable resource management ideology, and the integration of economic, social and ecological systems. The concept, as it relates to architecture and development did not emerge until the 1950s, and catalysed increased interest in vernacular architecture and self-help housing (Mahgoub 1997).

> *Development does not mean continually getting bigger but is about qualitative improvement. In addition, sustainability does not mean sustained growth. At some point, a community stops getting larger but it continues to improve the quality of life of its inhabitants. (Brandon and Lombardi 2005: 9)*

In their exploration of the meaning of sustainable architecture, Owen and Dovey (2008) describe a dichotomy of extremes between ecology and aesthetics that aligns with the historically dominant quantitative ideology of science versus the competing qualitative ideology of architecture. In order to overcome this divide, there is an imperative to integrate social, cultural and environmental factors by *'bringing together mutual concerns with aesthetics, form and production'* (Lawrence and Low 1990: 493).

Scerri and James (2009) meanwhile suggested an approach to community development that includes four domains of practice: economic, ecological, political and cultural, which can be analysed as discrete elements of research and practice embedded in a qualitative framework, to avoid reducing sustainability merely to a technical quantitative indicator. This view is supported by Hamdi (2010) who argues that sustainability of the built environment requires reconciliation of environmental, social and economic demands to harness the potential for long-term maintenance of human well-being. Enhancing the sustainability continuum includes the resilience of the community and its courage to pursue follow-on enterprises, through knowledge and economic security (Rusch and Best 2014). Even so, the inclusion of governance in the model is essential for engaging social, environmental and economic sectors with the processes of authority that affect them (Magee, Scerri and James 2012).

Nevertheless, the reality is that development policy requires metrics as a means of justification, funding, implementation and evaluation, signifying that quantitative analysis needs to be included as a complement to qualitative research. Scerri and James' perspective (2010:

42) is that *'interweaving of the objective and the subjective'* allows indicator-centred research to contribute to the understanding and practice of sustainability and invites increasingly reliable knowledge and reflexivity in the research.

Questions regarding the wisdom of *imposing* development on indigenous peoples were raised in 1973 by Southern Highlands students at the University of Papua New Guinea.

> *What happens if they don't want your kind of development? What do we do if they want to go back to the way things were before you people came and disturbed their lives? (O'Collins 2007: 136)*

Historically architectural research has not been deeply engaged with the concept of social science as a technique for informing design practice. Nonetheless, the responses from semi-structured investigations into cultural norms and values can enrich the design process by identifying issues that were not anticipated from the architect's original viewpoint. Questions that would have remained unasked suggest multiple ways for architects to consider more inclusive design, sensitive to human needs.

> *With the benefit of hindsight, I now realise that I had experienced what another of my contemporaries, Bill Clarke, called the Golden Age in PNG, that brief but magical period for both the observers and the observed that was suspended between the end of tribal fighting and the onset of global capitalism. It was a time of discovery of other ways of inhabiting the earth (Waddell 2018: 7).*

In PNG, the practice of architecture in the formal sense has little connection to the ways in which people shape their lives and their homes. Academic writings on urbanisation describe housing as inadequate and falling outside the UN ideal of sustainable development goals for the provision of safe and affordable housing for all. But who determines the meaning of *'inadequate'* in the context of PNG?

Goddard (2005) notes in relation to Port Moresby that urban settlements had strong cultural roots tied to social networks linking urban and rural communities. In other words, villages of origin help shape the lives of city kin. Housing in this context thus remains largely *'unseen'* by policy makers as legitimate places for living. As this research seeks to show, the lure of the city as a place of opportunity and modernity does not negate the connection to village and kin (Goddard 2017), nor does it inevitably suggest a desire for a model of housing provided by government.

2.12 CONCLUDING REMARKS

This chapter reviewed relevant literature pertaining to traditional architecture in PNG to develop the theoretical context for this research. The chapter highlighted the importance of multidisciplinary research when considering stakeholder perceptions and aspirations for housing in contemporary PNG. The purpose of the chapter was to consolidate the reasons for use of a constructivist theoretical framework to underpin the research.

Consequently, following pathways of enquiry that recognise there are multiple social realities, ever changing and socially constructed, affords observation in a field-based experiential context that will tease out issues in which architecture, anthropology and human geography converge. The places in which we live, and how we understand, experience, and engage with these places, can perhaps be best understood though a constructivist paradigm, and through the knotted threads of past and present connections that are significant for people.

Irrespective of these concerns, we should not necessarily expect that this model will apply to all parts of the Highlands or other parts of PNG. However, an architecture of enquiry related to the generation of forms, the properties of materials and the dynamics of social and cultural conditions requires an understanding that no single reality is more correct than any other (Tilley 2006; Hobsbawm and Ranger 2012). As Relph (1981: 177) proposes, understanding and respecting the lived reality of everyday life involves '*a way of seeing that strives to omit nothing, yet imposes nothing. It takes the world whole and as it is given and attends carefully to the particularity of places and situations. It is the attempt to see clearly what there is.'*

It is in this context that the following research design framework has been derived from existing theory and literature, a review of which has established that there is opportunity to learn from the remaining traditional architecture to better serve modern PNG. In areas where Western influence, and the aspirations that it has generated, have largely displaced traditional norms and are reshaping traditional values, the likelihood of obtaining meaningful, relevant, and significant results from this case study are guided by the rationale and the theoretical framework outlined.

Chapter 3: Research Design and Methodology

3.0 INTRODUCTION

In the previous chapter a review of relevant literature pertaining to traditional architecture in PNG was presented that informs the theoretical and conceptual framework of this research. Housing transformation processes identified in the literature highlight the importance of the theories and principles of several threads of enquiry that deal with connections between people and their built environment.

The first section of this chapter presents the research framework, outlines the ontological stance and epistemology, and describes the design adopted by this research to achieve the aims and objectives stated in Chapter 1: to understand how housing transformation takes place, and the implications for traditional architecture of increased urbanisation in contemporary PNG. The literature review also exposed the general lack of theoretical and empirical research devoted specifically to architecture outside the social housing arena. Furthermore, much of the research focused on quantitative demographic studies in urban areas (Oram 1965; Langmore and Oram 1970; Levine and Levine 1979; Stretton 1979; 1984; Lavu 2012). It is therefore appropriate to pursue the topic by developing a robust theoretical framework that explores the more creative processes that trigger the generation of form and place-making. The study uses a multi-method approach involving a single-case study with two embedded units of analysis as strategy.

3.1 THEORETICAL FRAMEWORK AND PRINCIPLES

> *Go deeper. Do not be afraid to disturb this surface, to set its limpidity in motion. Be like the wind that shakes these trees. Let your gaze be penetrating, let it not limit itself to reflecting and mirroring. Let it transgress its limits a little (Lefebvre 2004: 80).*

Design outcomes encompass a process of identifying specific characteristics, choices, or interpretations, and provide an opportunity to discover new concepts for development of the built environment that are relevant and desirable for the people concerned. If we regard design in a problem-solving context, there is a need for a framework that will facilitate appropriate methods for analysing and resolving any issues that the data yield. It was natural therefore that

an approach to addressing design-based problems related to the built environment and the social nature of dwelling was positioned within the social science disciplines. Ingold (2013: 10) suggests that architecture should be considered as a discipline that shares with anthropology '*a concern to explore the creative processes that give rise to the environments we inhabit and the ways we perceive them*'. Discussion of, and justification for, an architectural research design aligned with social science methodology, is examined in this chapter.

3.2 DEFINING A FRAMEWORK FOR TRADITIONAL ARCHITECTURAL RESEARCH

PNG traditional architecture and the relationship between village society and the built environment guided the practical application of the research design. *Figure 3.1* is a visual representation of the framework employed, followed by an explanation of the theoretical position and the reasons for using this framework.

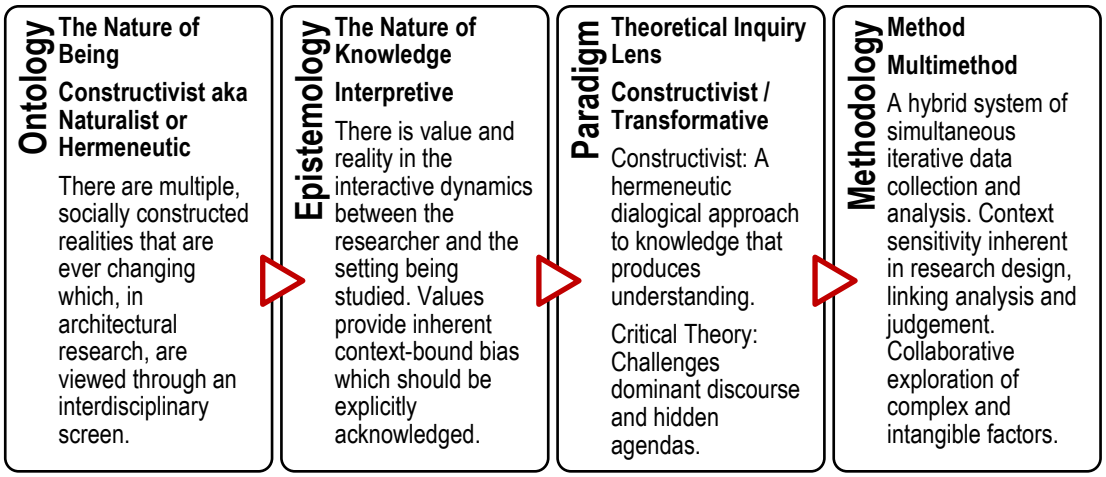

Figure 3.1.Research Design.
Compiled from literature by: Lawrence and Low (1990); Franz (1994); Jones, Torres and Arminio (2006); Knight and Ruddock (2008); Penn (2008); Groat and Wang (2013).

3.3 THE NATURE OF BEING: COLLECTIVE MEMORY, WANTOKISM AND PNG

Illustrated in PNG, cultural differences systematically eroded by colonialism nevertheless remain in the collective consciousness, providing ties to the past that influence social and physical constructs. The notion of '*Wantokism*' in the traditional sense, largely dictates how *'things are done'* in PNG. It is centred around an intricate tapestry of extended family bonds of trust, cooperation and commonly shared norms, and is thought to be the primary basis for collective action in PNG (Manuda 2007). In the Pacific Islands urban context however, Manuda (2007: 29) suggests it has the potential to become more like *'bounded solidarity'*, and therefore

could become a driver for negative responses; a form of social capital working at cross purposes with society and encouraging corruption (Fukuyama 2001; Nii 2013; Seniela, Babarinde and Holis 2019). Furthermore, Schram (2014) states that *wantok* denotes someone with a similar origin as oneself, and connotes a familiarity and mutual solidarity, but also connotes corruption, tribal identity, and in urban places, a drain and burden. '*A wantok is always a double being, one who posits an affinity of shared origin in a social situation defined by anomie [and] being a wantok means in some sense denying being a townsperson*' (Schram 2014: 2).

Understanding the importance of the Wantok system in PNG thus informed methodological choices, for with it comes an inherent bias of obligation and expectation, if access to resources (in this research taken to include indigenous knowledge), is privileged.

Western academic dialogue is an uncomfortable fit in a country still largely living in clan/kinship villages, retaining long-held cultural beliefs, dispersed in many tribes, and geographically fragmented. A constructivist ontology that considers the existence of multiple, socially constructed realities (Groat and Wang 2013) was hence the most apt for this research. In other words, there is an acceptance that humans create their own realities, that these values can be subjective, but can yield findings that emerge from the process of enquiry that are meaningful to both participants and researcher (Relph 1981; Tilley 2006; Relph 2008; Hobsbawm and Ranger 2012).

For this research, the aim was to consider what people's perceptions were about housing in villages to inform the choice of architectural solutions that meet their needs. To do this, a nuanced view structured around anthropological depth in relation to the human condition is necessary. Egenter (2006: 1) warned that contemporary architecture in urbanised environments is based on restricted knowledge where '*man appears only marginally as user, represented by functional needs.*' This is precisely why consideration of cultural norms and values in traditional villages, from the perspective of participants in the case study villages, are important if the premise is that in PNG village values are transposed to urban settings.

Under the social sciences umbrella, built environment research is 'aimed at understanding the social structure and patterns of interaction between those working within and affected by the built environment, and the agencies and institutions that structure it' (Dainty 2008: 6). This satisfies a need for a co-production of knowledge, whereby researchers use real world context to provide depth of understanding, rather than the predominant rationalist paradigm, which emphasises causality over meaning (Dainty 2008). Moreover, constructivist

ontology melds with the general characteristic of the architectural design process, where the relationship between the brief and the design act iteratively in a complex and emergent sense. It considers how participants view themselves and the world around them (including social norms derived from community values) therefore, selecting a test case such as a village can allow the exploration of new issues and development of new ways of looking at design outcomes (Tan 2018). Constructivist ontology has a bottom-up approach but also allows for a strong deductive element, using participants' views to build broad themes and generate theory interconnecting those themes, suggest Creswell and Plano Clark (2011).

Babbie (2010), advocated that induction and deduction can work together as complementary ways to strengthen research outcomes of both qualitative and quantitative research methods; shown diagrammatically in *Figure 3.2*.

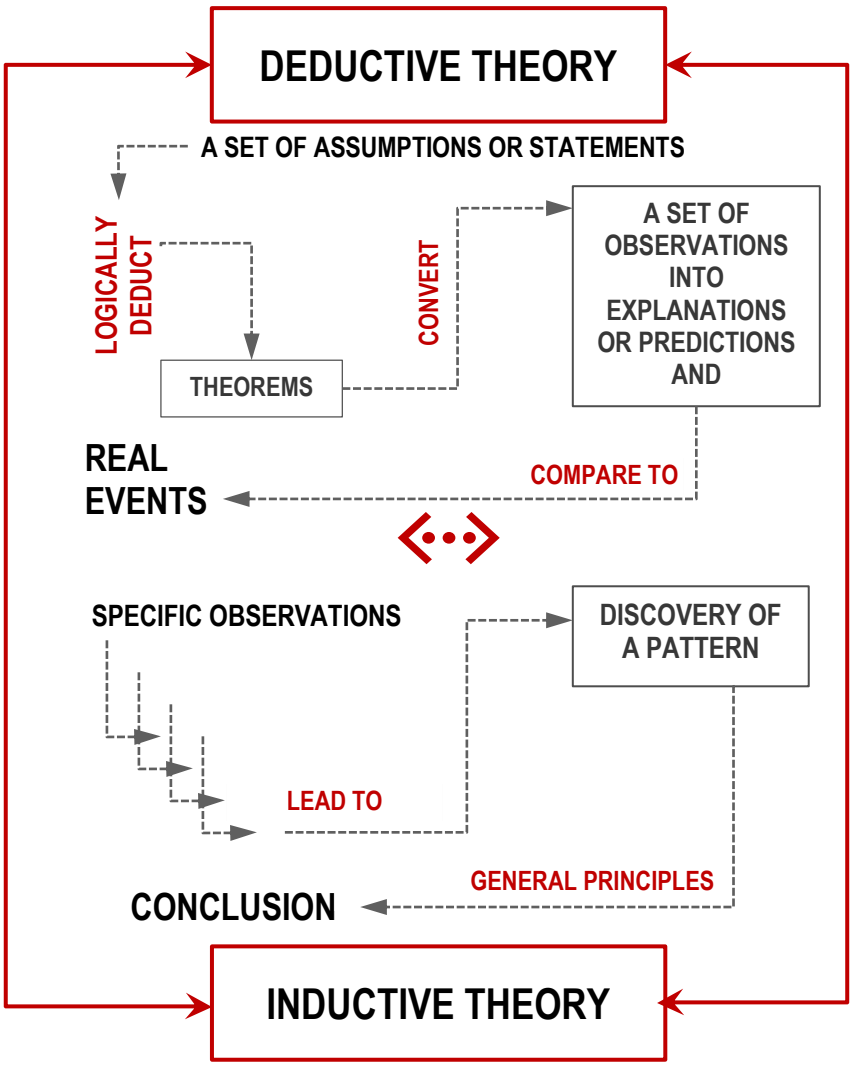

Figure 3.2. Inductive and Deductive Theory.
Complementary approaches to strengthen research outcomes (by author).

Neither the deductive approach, nor the inductive approach alone, were thought to be able to provide enough validity and were therefore rejected as mutually exclusive avenues. In combination, however, they provide a firm foundation for validity and reflexivity.

Because buildings function interdependently as social and cultural structures, unified by, and unifying their environment, issues such as aesthetics, materiality and constructability also need consideration (Penn 2008). Design knowledge is largely tacit and intuitive, developed though a community of practice and evolving collaborative exploration (Penn 2008). Anecdotal evidence indicates a collaborative and emergent nature to traditional architecture also, further confirming a choice of framework that acknowledges ever-changing cultural realities and tacit knowledge[38]. In a country like PNG, where cultural ties are paramount, the research design would thus require combining various stances.

In summary, therefore, the rationale for a constructivist ontology for this research is that it provides a connection between the phenomenon of traditional architecture in transition, through an interpretive epistemological stance. The theoretical lens guiding the research methods, and the subsequent data collection using a single case study with two embedded units of analysis (Highlands and Coastal villages) provide a basis for analysis of the research problem. A diagram outlining these connections is shown in *Figure 3.3*, followed by explanation of the overarching epistemology and theoretical lens.

[38] Tacit knowledge is a construct associated with philosopher Michael Polanyi. Polanyi stated that we inevitably know more than we can express verbally. He suggested that tacit knowledge is an intuitive and at times unconscious form of knowledge (Strati 2012).

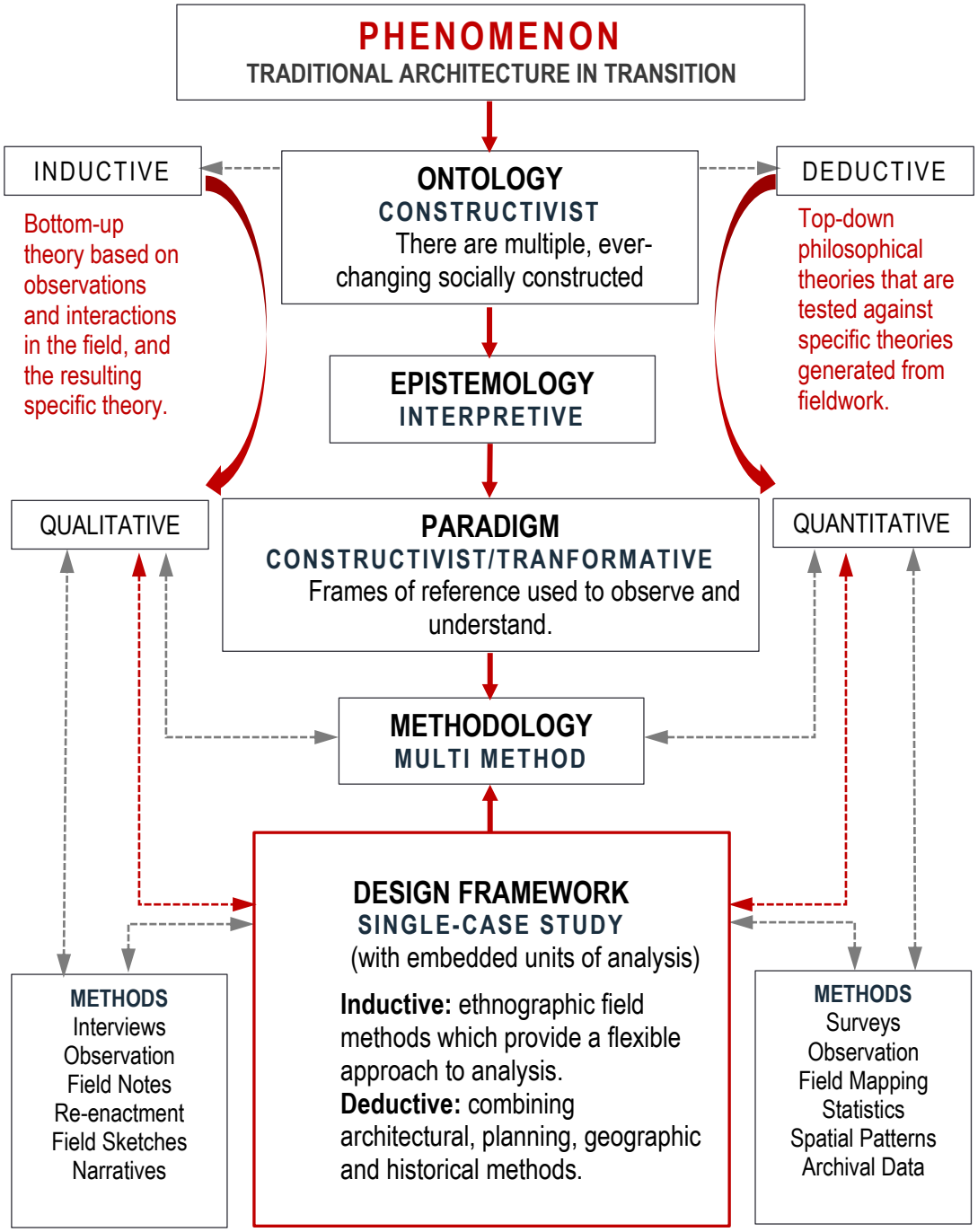

Figure 3.3. Research Design.
By author. Compiled from literature by: Jick (1979); Lawrence and Low (1990); Merriam (1998); Bryman (2006); Gold (2007); Goldstein (2007); Madden (2010); Groat and Wang (2013); Yin (2014); Sarvimäki (2017).

3.4 THE NATURE OF KNOWLEDGE: CONCEALMENT AND REVELATION

An interpretive epistemological stance was taken for this research to minimise the inherent indecision regarding theoretical discipline in the built environment arena (Lawrence

and Low 1990; Runeson and Skitmore 2008; Chynoweth 2009). Scholars of the built environment argue for a multi-method theoretical framework in which to position research of this kind because it provides for a diversified methodology similar to that used for the design and construction of buildings in their environments, and reflects the multiple real world traditions of the industry (Dainty 2008).

Nevertheless, Menacere (2016) advises that there is little consensus on the meaning or significance of theoretical underpinnings in built environment literature, and confusion even about the meaning of research terms. In positioning this research then, epistemology is about the acquisition of knowledge, and seeking ways to understand what represents knowledge. While ontology considers the nature of being, epistemology looks at how it can be understood, and for this research is considered through an interpretive stance.

An interpretivist stance allows for a flexible research structure, receptive to capturing meanings while seeking to understand specific context, with the researcher and informants interdependent (Franz 1994; Austin et al. 2001; Bryman 2006). Thus, it is accepted that a fixed research design prior to entering the field is not entirely possible, due to the complex and unpredictable nature of what may be perceived as reality by the participants in the field (Yin 2014). The intent is for the researcher to remain open to new ways of knowing, made evident by observing and listening to participants as the study progresses (Blatter 2008; Edirisingha 2012). An emic approach, however, does not always elicit answers. Firstly, people often act differently when being observed, and with limited time is it difficult to build sufficient rapport to gain access to thoughts and private rituals which may be important for understanding.

In many areas of PNG knowledge is often tightly held by older people considered to be keepers of knowledge, concealed from the eyes of others until revelation is warranted. Applicable not only to physical constructs but also the spirit world and thoughts (Telban 2018a; 2018b), understanding the architectural imagination in PNG requires an interpretivist lens through which to perceive the interrelationship between visible and invisible domains.

Telban (2018), referring to the Sepik region of PNG, posits that concealment, in a practical everyday sense generally for PNG, means that in people's private houses many things are hidden (concealed) so that they do not attract and seduce visitors' eyes. A further extension is concealment of thoughts which will only be revealed over time, through a person's speech or deeds. He does however caution that these explanations are more complicated when

obligations to kinship systems are taken into account (B Telban 2018a, personal communication, 11 January).

There have been several instances throughout this research where the influence of the past has been made evident, whether symbolically or interwoven with beliefs and practices that govern people's everyday lives. Hauser-Schäublin (2011: 46) relates the interplay between what is revealed and that which is hidden, to the ubiquitous string bag '*bilum'* used throughout PNG. Constructed using a looping knotting technique, it is at once revealing and concealing because of its semi-transparent structure.

This approach, then, allows the focus of the research to concentrate on understanding and interpretation of the distinction between facts and value judgements, and is consistent with the interpretivist stance regarding humans' ability to adapt to contextual social realities, rather than to generalise and predict causes and effects (Onwuegbuzie 2012). This perspective, when applied to architecture in PNG, explains the choice of a constructivist/transformative frame of reference using case study as a strategy.

3.5 THEORETICAL LENS: CONSTRUCTIVIST/TRANSFORMATIVE PARADIGM

It follows from the epistemological premise that exploring the phenomenon of transformation in traditional architecture and the link between culture and economic development requires a multi-method structure drawing on paradigms principally from architecture, planning, anthropology, ethnography, geography and history among others. Menacere (2016) confirms the need for a methodology that guides the process of collecting and analysing information to understand the phenomenon being researched.

The decision to conduct multi-method research hinges on the research question, the purpose of the research and the context of the topic. Chynoweth (2009) proposed that the predominantly applied nature of built environment research falls within five subject areas: management, economics, law, technology and design, and that epistemological integration is a realistic aspiration for improving the relevance of academic research in the built environment field. Similarly, a multi-disciplinary approach to addressing the meaning of home and place was used by Reinders and Van Der Land (2008) to bring attention to the complex relationship between home, social networks and basic needs. They maintain that global flows of capital as well as ideas affect a sense of home, making multi-disciplinary methodology suitable for this research.

Moreover, Foruzanmehr and Vellinga (2011: 284) stress the need for research that accounts for *'the dynamic and complex way in which environmental, technical, social, cultural and economic dimensions are intricately linked'* in their specific context, to discover meaningful information about traditional architecture and its frequent abandonment in favour of other choices made by local people as described in Chapter 2. Correspondingly, Foruzanmehr and Vellinga (2011) used a case study to understand the interrelationship between historic, cultural and environmental factors to tease out lessons regarding the continuity or abandonment of vernacular tradition. In a similar manner, a case study was selected for this research to learn lessons regarding the transitional state of PNG traditional architecture in the modern urban setting.

3.6 METHODOLOGY: MULTI-METHOD RESEARCH

The primary strategy for this research was a single-case study with two embedded units of analysis, using qualitative techniques such as semi-structured interviews, participant observation, narrative discourse, surveys, drawings and visual analysis. Case study provides the holistic, in-depth investigation needed for this research as it can elicit participant viewpoints by using multiple sources of data.

3.6.1 Selection of Case Study Strategy

Case study research, and by extension analysis of the data, begins with the research question, the underlying themes and the context positioning the case. As noted by Gray (2014) the strategies and tactics used for analysis should be established prior to data collection to ensure that meaningful analysis can be generated from data (suited to the research aims and objectives).

The data collection for this case study was pragmatic in approach, building a foundation of a well organised protocol, while being sufficiently flexible to allow openness to rival explanations, thereby strengthening argumentation (Sarvimäki 2017). Case study as strategy is particularly useful when looking for patterns of complex behaviours to describe and explain phenomena. Yin (2014) defines a case study as:

> *'an empirical enquiry that investigates a contemporary phenomenon (the 'case') in depth and within its real world context, especially when the boundaries between phenomenon and context may not be clearly evident, […] A case study enquiry relies on multiple sources of evidence, with data needing to converge in a triangulating fashion' (Yin 2014: 16-17).*

In this research context is taken to mean the physical, social and cultural settings related to the built environment of the selected embedded case study sites, Kunguma and Tubusereia, PNG. Case study is most relevant when used to answer questions of how and why, when there is no requirement to control behavioural events. Thus, a study in both the Mt Hagen and Port Moresby regions can explore how homes are constructed in contrasting rural and urban settings in the contemporary context and why transition away from traditional architecture is taking place.

An empirical study is one based on primary data, while a contemporary phenomenon is taken to be one that is relatively recent (Remenyi 2011). On the other hand, Groat and Wang (2013) suggest that for architectural research a phenomenon does not need to be contemporary, rather the setting is more important, as is the capacity of the study to explain causal links.

Nonetheless, causality is also a potential weakness in case studies, particularly those involving other cultures, as it is likely to be complex and therefore challenging to explain, particularly when the focus is on understanding the dynamics across cases. For that reason Eisenhardt (1989) concludes that multiple data collection methods provide stronger substantiation of constructs and hypotheses through triangulation.

Case study is an overarching term that describes a method of enquiry focused on a specific instance or event, enriched with multiple sources of data to tease out a narrative and thereby assemble a convincing argument to answer a research question. Remenyi (2011) proposes that a key aspect of case study is its narrative form:

> *The story needs to be unfolded in a way that the lessons learned from the research are visible and convincing. If any quantitative analysis was undertaken by the case study research, it has to be analysed separately and then the results of this analysis need to be integrated into the overall case study narrative (Remenyi 2011: 127).*

Similarly, Tan (2018) states that a case study is structured to persuasively tell a significant story using a small case in its context, to provide for descriptive, explanatory or interpretive findings. Eisenhardt (1989) supports this, but also recommends incorporating quantitative data for its ability to reveal false impressions in the qualitative data or, conversely, bolster qualitative data if it corroborates those findings from qualitative evidence.

Sarvimäki (2017) proposes that building a solid foundation for research analysis includes looking at rival explanations for interpreting case study outcomes as it is one way to ensure the

quality of the analysis. Rival explanations provide critical checks and balances as assurance of the credibility of the research findings through a systematic examination of alternative propositions.

Although Yin (2014) describes six different kinds of real world rival explanations, *comingled* and *societal* rival theories are the best fit for this research as shown in Table 3.1.

Table 3.1
Different Kinds of Rival Explanations.
Adapted from (Yin 2014: 141)

Type of Rival Real-World Rivals	**Description or Examples**
Direct Rival	An intervention ('suspect 2') other than the target (Practice or Policy) intervention ('suspect 1') accounts for the result ('the butler did it')
Comingled Rival	**Other interventions and the target intervention both (Practice and Policy) contributed to the results ('it wasn't only me')**
Implementation Rival	The implementation process, not the substantive intervention, accounts for the results ('did we do it right?')
Rival Theory	A theory different from the original theory explains the results better ('it's elementary, my dear Watson')
Super Rival	A force larger than but including the intervention accounts for the results ('it's bigger than both of us')
Societal Rival	**Societal trends, not any particular force or intervention, accounts for the results ('the times they are a-changin')**

3.6.2 Challenges with the Case Study Approach

A major challenge with the case study as strategy approach is ensuring clarity and reliability, particularly in a single-case study, as it relies on multiple sources of evidence which need to converge in a triangulating fashion and which, together with theoretical propositions developed at the outset, guide data collection and analysis. The purpose of triangulation is to establish convergence in the data, and to pick up any inconsistencies or contradictions that emerge.

Reliability is an indicator of how a research instrument can consistently reproduce results. A case study protocol is one way of increasing the reliability of case study research, however in cases such as this that involve fieldwork in another country it is important to ensure that the protocol has explicit and well-planned field procedures. Challenges with sources of evidence encountered are outlined in Table 3.2.

Table 3.2
Challenges with Case Study Sources of Evidence for this Research

Source of Evidence	Challenge Encountered
Documentation; Archival Records	Retrievability - difficult to find Biased selectivity – incomplete collections Access – not available online
Interviews	Time consuming; Translator bias
Direct Observation	Selectivity – broad coverage difficult in short time period Cost – research in another country
Participant Observation	Same as above Participant-Observer bias; Translator bias
Physical Structure	Availability – inconsistent across field sites

3.6.3 Ethnographic Approaches to Built Environment Research

> *Theory, reflection, musings, quandaries, inspirations and analytical leaps of discovery are all contemporaneous with the practice of doing ethnographic research (Madden 2010: 7)*

More recently, innovative research in the construction industry has employed participatory and collaborative ethnographic approaches, including photography, to develop understanding and provide analysis for implementation purposes; an interdisciplinary weaving of academic and applied sides of the built environment divide (Pink et al. 2010). Ethnographic approaches to research in the built environment suggest an inductive methodology where insights often emerge from naturalistic description, departing from the dominant positivist tradition that exists in the construction industry, and there is a strengthening history of such approaches within the design professional sector of the industry (Pink et al. 2010; Pavlides and Cranz 2011).

The ethnographic approach employed for this research integrates a blend of research methods to obtain rich data, much of which was generated from informal conversations garnered during a range of spontaneous, participant driven, everyday experiences. As it embraces the possibility of discordant perspectives, adopting a multi-method approach can yield productive interpretations.

Madden (2010) further articulates the argument that ethnography combines broad as well as narrow ways to build theories using both inductive and deductive perspectives to seek to understand and explain complex stories, not only for the sake of conforming to theoretical lenses, but to *'find challenges, exceptions and problems from our inductive bottom-up*

standpoint that cause us to reconsider and refine our deductive, top-down perspectives', (Madden 2010: 18).

Pavlides and Cranz (2011) propose an ethnographic approach to research of the built environment to overcome the etic process of designing a building, starting with a set of assumptions and intentions about what will work. Conversely an emic approach aims to discover how people use their buildings to develop a better understanding of built environment design.

In *'Tales of the Field'* Van Maanen (2011: 5) says that *'ethnography irrevocably influences the interests and lives of the people represented in them – individually and collectively, for better or worse. Writers know this, and self-imposed limits mark all ethnographies*. The small window of opportunity afforded this research provides one of several ways to add to the discourse, conjecture and inference about traditional architecture in villages and village-like settlements in the modern urban fabric of Papua New Guinea, while acknowledging the inherent researcher bias and ethical boundaries that inevitably need to be considered (Merriam 1998).

3.7 CONCLUDING REMARKS

Considering the theoretical dynamic in which this research is positioned, the reasons for progressing to a multi-method framework for gathering evidence must inevitably lead to the process itself. The ways in which evidence can be effectively evaluated in relation to the research question requires rigorous categorising, organising, and data analysis to provide for an interpretation that is resourceful but nevertheless does not meander into the realm of fiction. Therefore, a single-case study with two embedded units of analysis (Groat and Wang 2013; Yin 2014), using both inductive and deductive methods of data collection and analysis were used for this research and are described in more detail in the following chapters.

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Chapter 4: Methods and Data Collection

> *Research has one end: the discovery of truth. Its purpose is to learn what has never been known before; to ask a significant question for which no conclusive answer has previously been found; and, by collecting and interpreting relevant data, to find an answer to that question (Leedy and Ormrod 2013: v).*

4.0 INTRODUCTION

In the preceding chapter a framework for analysing housing transformation was outlined, and the proposed research design was described.

This chapter presents the processes of the primary research, discusses the selection and analysis of village housing, and is specifically related to the sample of people interviewed. It outlines the methods used to explore the process of transformation of traditional housing, people's views regarding modernisation, and observations concerning two propositions. First, the proposition that, for Papua New Guinea housing, architectural change occurs because of internal drivers such as a hunger for knowledge and new insights, as well as economic, social, and environmental dynamics; not merely external influences brought about by colonisation. Secondly, real economic benefits result from continued use of traditional housing design and construction methods, which maintain and extend the indigenous knowledge inherent in traditional architectures and which can be economically competitive with mainstream housing.

Architecture is used here as a term to encompass the built environment, specifically housing; traditional, transitional, and informal. This chapter also discusses the reasons for selecting the research methods and the population as the most suitable in this case.

Section 4.1 details the conduct of the study, context of the research methods employed and outlines the survey instruments used. Section 4.1.4 and Section 4.1.5 detail the specific study areas of Western Highlands Province and Central Province respectively. Section 4.2 outlines the interview process and Sections 4.4 participant observation procedures. Section 4.5 describes the data handling processes. Section 4.6 outlines data analysis methods, while Section 4.7 discusses ethics and limitations of the study. Finally, Section 4.8. provides concluding remarks.

4.1 CONTEXT

Although a united country after 1974 Independence, fragmentation and regionalism in PNG is difficult to eradicate. Highlanders were, and remain, largely subsistence farmers (National Statistical Office Papua New Guinea 2017a) and have little in common with the coastal Papuans who have had much longer exposure to colonial influences. Neither their customs nor their languages are the same. Similarly, their architecture is distinctive and unique to their regions. While contextualised perspectives of the ontological, epistemological, and methodological paradigms previously described inform specific methods of the research process to ensure reliability and validity of the results, in PNG the remoteness and the low socio-economic development require a largely pragmatic approach to data collection.

4.1.1 Design: Multiple Methods in Architectural Research

Symonds and Gorard (2008) suggest that focus should be on the quality of the research techniques and data application, regardless of the typology or the research paradigm, claiming that using multiple methods reflects actual research practice and acknowledges research as a *'craft'*. It is evident from Chapter 2 that methodology is disputed territory, however, the dominant ideology in the built environment domain, when researching other cultures, validates a multi-method approach (Knight and Ruddock 2008; Pink et al. 2010; Farrell 2011) using the most appropriate typology for the research question while leaving room to embrace serendipitous availability of data in the architectural arena and in subsequent analysis.

Built environment methods have been dominantly positivist and quantitative, addressing triple-bottom line positions of '*Economy, Society and the Environment*' (Elkington 1998: 22) to which corporations and governments can relate. Also known as '*Profits, People and Planet',* the triple bottom line rests on the premise that integrating economic capital (profits) as a subsystem of sustainable business practices, which also include social (people) and environmental (planet) agendas, allows businesses the ability to evolve and grow in a way that meets the needs of future generations.

Alternatively, a constructivist qualitative paradigm is currently gaining recognition (Pink et al. 2010), rationalising a holistic multi-method approach. Yin (2014) stresses the importance of triangulation on the premise that strengths and weaknesses are counter-balanced when combining methods; hence this study uses both qualitative and quantitative methods to strengthen the final analysis. Because the design is predominantly qualitative and multi-method,

in a country such as PNG where gathering of data may be sporadic[39], a concurrent transformative design is reasonable, as it is consistent with an iterative research and analysis process. Creswell et al. (2003) posit that in transformative design, integration of data can occur either during the analysis or interpretation phase, which is also applicable in a multi-method design.

Multi-method research encompasses a wide range of research strategies designed to overcome weaknesses in existing data sources. It can be used to provide breadth of understanding regarding outcomes and implications and, equally pertinent here, used for confirmatory purposes to strengthen research conclusions with complementary insights (McKendrick 1999; Salomon 2011). The overriding factor is the rigour with which the research is undertaken, and this largely rests on procedural clarity to ensure accommodation of its full complexity. McKendrick (1999) argues that multi-method, across research traditions (as undertaken for this research), presents a range of substantive and strategic approaches to fulfil tactical and compensatory objectives consistent with traditional models. Thus, an interdependent approach was thought to be the most sensitive to the research question for its ability to compare statistical data with attitudes shared in interviews, and then to use this information for analysis in other locales (McKendrick 1999).

Consequently, interdependently referenced information from embedded units of analysis in this case study offsets the potential effects of small sample sizes. An embedded case study is a case study containing more than one unit of analysis and, as Scholtz and Tietje (2002) posit, such case studies are not limited to qualitative analysis alone, but allow for multiple methods, including statistical analysis that need to be synthesised for complex problem solving. *Figure 4.1* is a conceptual representation of the framework for this research.

[39] For example, for this research there were interruptions to travel to field areas and collection of data due to tribal fighting during political elections and lack of access due to earthquake activity (landslides). Less dangerous interruptions involved participants leaving the area for funerals, bride price ceremonies and other cultural responsibilities.

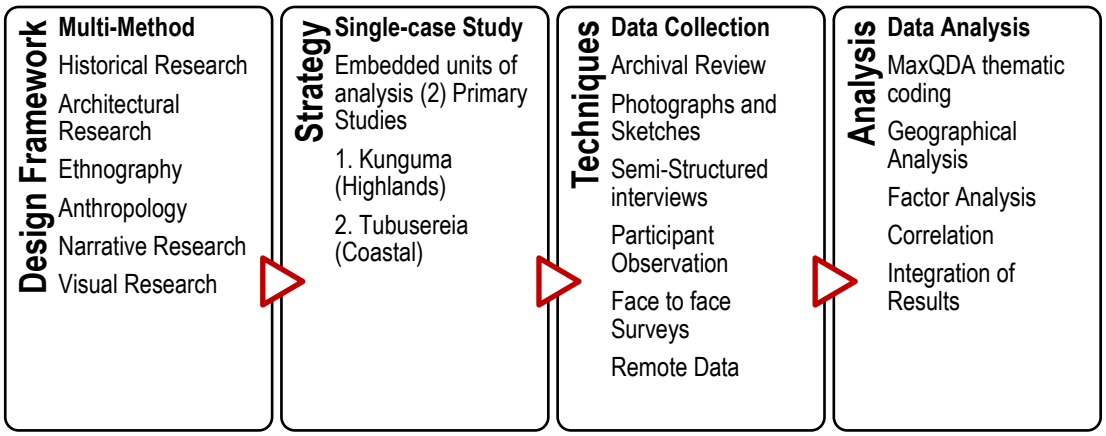

Figure 4.1. Research Framework.
Compiled from literature by: Gonduan (2000); Scholtz and Tietje (2002); Groat and Wang (2013); Leedy and Ormrod (2013); Yin (2014).

Participant observation, face-to-face surveys, field notes and electronic sources provide quantitative data as evidence to explain the merits of the qualitative data. Yin (2014) proposes that a single-case study with embedded units of analysis has the capacity to explain causal links by using multiple sources of evidence, while Blatter (2008) suggests it is also able to look at the specific links between cause and effect, rather than merely the strength of a causal factor provided by Large-N studies.

The constructivist ontology supports selecting crucial cases to make theoretical generalisations and process tracing to analyse and document the evidence (inductive). Using embedded units of analysis provides for congruence (deductive). The premise is that a single dataset is not enough to address the range of social processes that determine the form and qualities of PNG traditional housing and the way in which contemporary residents live their lives in their houses and neighbourhoods.

> *Although scepticism abounds, case studies - particularly embedded case studies - are considered an appropriate approach to real, complex, current problems that cannot be treated simply by one of the known analytic methods, such as experiment, proof, or survey (Scholtz and Tietje 2002: 5).*

Thus, data collection methods have been specifically aimed at circumventing the issue of limited access to data. The integration of different or complementary embedded cases is appropriate for complex, socially relevant problems such as housing.

4.1 PRIMARY RESEARCH: CONDUCT OF THE STUDY

Denscombe (2012) discusses the importance of describing methods of data collection, and the type of data collected, as a crucial step in the research process, to provide for validity and reliability of the research. Although several techniques were used in this study, primary research was undertaken during field trips to the two embedded case study areas, Kunguma and Tubusereia, incorporating photography and drawing/sketching, semi-structured interviews, participant observation and face to face surveys as data collection instruments. Cultural interviews and interviews as conversation were used to provide clarity regarding norms, values, understandings and tacit behaviour (Gubrium and Holstein 2014: 118).

The data collection methods for this research intentionally crossed traditions. As strategy, this was a single-case study with two villages as embedded units of analysis (Groat and Wang 2013; Leedy and Ormrod 2013; Yin 2014).

Consequently, case study techniques applied for data collection were informed in relation to PNG, by Gonduan (2000) and those of the Village Studies Project (Ruff and Ruff 1990; Holden 2011; Costigan 2014) among others, as these were considered to be the most applicable to architectural research in PNG.

Although both Gonduan's work and that of the Village Studies Project were longitudinal studies, and Gonduan could also access information not generally available to those who were not part of the Iatmul community as he was, the techniques he used were relevant to this research. However, there was no opportunity for a longitudinal study because fieldwork for this research was restricted both in time and access. In contrast, therefore, an alternative approach to data collection was needed: how to obtain reliable data with little time in the field, minimal funding and limited access to participants, without compromising the basic principles of effective cross-cultural case-study research.

Data collection in PNG, which does not perform very well on a wide range of development indicators (UN Development Programme 2016) and is topographically challenging, particularly in rural and remote areas, means that transport and communication are expensive and not always available (Watson 2015).

Many areas lack reliable communication altogether, yet in recent years, despite intermittent broadband coverage and variations in access to computers and smartphones (UN Development Programme 2016), mobile phones and social media have become widely used

and effective modes of communication. The exponential spread of information and communication technologies, along with rising education and literacy rates, has provided individuals with new tools for discussing their own lives and environments.

Leveraging social media platforms and mobile phones is becoming increasingly acceptable as a cost-effective data collection method in areas where face to face or long-term access is not viable. For example, the Australian Government funded a trial project for mobile phone data collection in the law and justice sector (Watson and Morgan 2015) to mitigate the shortcomings of a previously long and unsuccessful hard copy survey method of data collection, and to determine whether data collection via mobile phone was more effective than other methods. Nevertheless, for that study, mobile phones were used only as a data collection tool for the dissemination of online surveys and text questionnaires with a quantitative slant. The requirement for this research, on the other hand, was to confirm visual data regarding housing, and to open a dialogue, without having to be physically at the site, to augment more traditional forms of data collection.

Drawing on the concept of Enterprise 2.0[40] in the commercial arena, where web-based authoring functions allow employees to publish and share their opinions and knowledge, this research adopted the social network site Facebook as a supplementary electronic grassroots mobilisation tool to engage with a larger distribution of collaborative participants.

Raento, Oulasvirta and Eagle (2009) argue that mobile phones and other personal devices are willingly carried by a considerable number of people, integrate technologies for automatic observation, and can enable communication with remote researchers, allowing unobtrusive and cost-effective access to previously inaccessible sources of data. Furthermore, research by Kaski, Mursau and Maybanks (2014) noted that the use of mobile phone technology in PNG could be appropriate for exploratory research which looks at uncovering issues, particularly with a known small population with high access to mobile phones, as is the case in both Kunguma and Tubusereia.

In addition, Debeljak (2014) showed that internet use via mobile phones is diversifying to include both young and older citizens across different PNG provinces, and that these users

[40] Enterprise 2.0: the term 'Enterprise 2.0' was first coined in 2006 by Harvard Business School Associate Professor Andrew McAfee. The concept of integrated use of electronic and social media platforms for business agility suggested that adoption of Enterprise 2.0 technologies can spur efficiency, productivity and innovation by encouraging stakeholders to share information and discuss business problems in an open, collaborative setting.

access Facebook whenever they have phone credit. They do this to keep in touch with family and friends, stay up to date with news and research topics that interest them as well as needing it to access higher education.

This observation is supported by Zoppos (2012) who demonstrated that Facebook, currently the largest and most popular social networking site on the Internet in terms of membership, can allow researchers to capitalise on access to diverse racial communities, and to use the articulation of a 'Friend' list as a snowball method to recruit participants. Moreover, Facebook users create or join existing groups that reflect their personal and social interests (Baltar and Brunet 2012), enabling researchers to recruit eligible research participants by posting notices or individually contacting group members to promote their research (Zoppos 2012). Facebook can be used in virtual ethnography (also known as e-ethnography or netnography) (Hardey 2011), collaboratively employing personal and social networks for interactions with research participants and collectively for obtaining shared data.

Finally, this research draws on suggestions by Watson (2015) that it could be possible, for example, to combine field visits to collect detailed information including visual data, and build rapport with project participants and then enhance the process with remote data collection. Synthesising the detailed data gathered in field visits with remote data collection can thus provide a greater understanding of the situation at a research site.

The literature reviewed confirms that the methods adopted for this research were appropriate under the circumstances. Consequently, time restriction in the field meant that field data were supplemented by remote data collection using Facebook via mobile phone. By creating a 'closed' Facebook group the range of participants could be restricted or expanded depending on the data required. It allowed for less unwanted intrusions from unsolicited participants without a genuine interest in the research and maintained more privacy than a public page. Another benefit was that there was no time restriction on accessing Facebook for the participants, meaning that they did not need to contribute until they had the means or desire to do so, and the willingness to share their visual data in a non-threatening setting.

Accordingly, the disciplined study of interpreting meaning through a combination of fieldwork and shared knowledge, and making inferences using a variety of research techniques to document alternative realities (Spradley 1979; Emerson, Fretz and Shaw 1995; Madden 2010) supports the ethnographic component of this research, despite limited time in the field.

4.1.1 Ethnography: Fieldwork in the Built Environment

Ethnography is a qualitative field of research concerned with interpreting phenomena with, in many instances, a bias towards transformative consequences (Madden 2010) and the aim of making applied interventions (Pink et al. 2010). It emphasises the immersion of the researcher in a socio-cultural context, and for architectural research specifically, to elicit patterns of interpretation that are tied to the material world of that context (Groat and Wang 2013).

Site-based research provides the opportunity to observe and record processes and to gain insights about a group that would be difficult to learn about by other methods (Emerson, Fretz and Shaw 1995; Leedy and Ormrod 2013). Therefore, for this research, collection of ethnographic data included observation, formal and informal semi-structured interviews, and participation in the daily lives of the communities being researched. Because the time spent at each community was limited, participant observation was augmented with virtual ethnography (Hardey 2011) as previously discussed.

4.1.2 Archival Data

What traditional architecture existed, and trends away from it, was examined through archival material, available from several sources including the Macleay Museum, The National Anthropological Association (US), Pacific Manuscripts Bureau (ANU), Fryer Library, University of Queensland, Australian National Library, NSW State Library, the PNG National Research Institute (NRI), University of California Special Collections Archives, UC San Diego, various online photographic archives, and current PNG newspapers (Post-Courier and National) online.

Interpretation of the historical data rested upon the assumptions that:

- Adaptation as shown existed not only in response to the invasion of colonial administration and missionaries, but also internal dynamics and,
- Western perspectives and the technology of the era may have coloured data recording.

Visual research methods are applicable when tracing social change, as a form of visual discourse and often as empirical evidence, despite the epistemological concerns regarding the use of images as subjective data; offering alternative positions, experiences, and educated assumptions (Stanczak 2007). Images add an additional layer of data to statistical, theoretical or conceptual argumentation, and the subjectively interpreted lived experiences of the participants, for more robust triangulation (Pink 2007; Stanczak 2007). Similarly Madden (2010:

108) states that images are most effective when contextualised by description and analysis so that they act as an *'amplification device'* for the text. This is significant for architectural research which uses graphics of various kinds to interpret or convey meaning.

In his studies of immigrant communities, Gold (2007) used photographs as a corrective to academic distancing by facilitating involvement with people and settings, thereby enhancing his own insights. He used images to answer questions suggested by literature review, and to refine the findings of his analyses. Correspondingly Wagner (2007) suggests that fieldwork can be complemented by observation-based enquiry such as documentary photography, regarded as a durable and useful recording of a cultural setting at a particular time and from a particular viewpoint. Images that captured currents of cultural diffusion and the visual traces of historical change however were often taken by missionary groups who were the primary Western presence in remote regions (Miller 2007).

Miller warns that these archives need to be approached with critical scrutiny to lend veracity to written descriptions as well as to challenge accounts of historical events (Miller 2007). For this research, visual analysis assists with evaluation, verification and interpretation. In addition to photographic evidence (taken in the field and from Facebook), visual data include designs, layouts, and patterns for formal analysis that are intended to provide a detailed and nuanced narrative.

Descriptions based on verbal accounts use narrative research strategies. Andrews, Squire and Tamboukou (2013: 27) suggest that narrative research presents perceptions *'of different and sometimes contradictory layers of meaning, to bring them into useful dialogue with each other, and to understand more about individual and social change'.* A similar strategy was employed for this research, as shown in the discussion of the birthing house at Kunguma (see Chapter 5). Moreover, Haigh (2008) notes that oral history is a legitimate means of collecting information about a dying culture or skill by creating narratives that interpret the past. Since PNG had no known written language prior to colonisation, this is a relevant research strategy, in keeping with the context of culture. The prehistory of New Guinea spans a continuum of 2000 generations, *'expressed through language, stories and culture'* (Hope and Haberle 2005: 542), therefore eliciting narratives is included as a means of informing this research.

Multi-method research across disciplines also gives credence to the use of semi-structured and open-ended interviews to generate insights and concepts, and to promote understanding by gathering both quantitative and qualitative data. In this research it was

necessary to record oral history while acknowledging that access to respondents was difficult and there were language barriers to overcome. Several different interview techniques were employed, including interviews as conversation, topical interviews, and cultural interviews.

Interviews as conversation encourage the sharing information to obtain a general flavour about a topic without specific questions. Although they can be unpredictable, they can also reveal unexpected information, as participants may feel more relaxed in a conversational setting and therefore express more personal experiences. As they are non-directed they are potentially harder to analyse (Scheibelhofer 2008). Conversational interviews undertaken at Kunguma during the *Haus Man* construction elicited incidental information that supported the structured questions of the survey, more so once researchers gained the trust of the builders. Similarly, at Tubusereia, the inclusion of a conversational interview format for the focus group elicited unexpected information about social issues associated with living over the sea.

Topical interviews, on the other hand, are generally semi-structured. A range of topics or themes can be introduced, and participants are guided to keep on target so that information relevant to the researcher's concerns can be elicited. While this type of interview has the benefit of obtaining consistency of data, there is also the risk of missing out on more nuanced information which may be of greater significance from the point of view of the participants. Hence the inclusion of conversational interviews helped fill this gap.

Similarly, cultural interviews can be semi-structured, however they rest on the principle of a pre-existing cultural reality and the researcher's ability to establish sufficient rapport with participants to be able to elicit details of daily life and/or sensitive matters (Gubrium and Holstein 2001). In this sense there is a risk of not being able to obtain sufficient data for analysis from cultural interviews alone, and several techniques outlined above were used to ensure sufficient data are available for cross-referencing as suggested by Haigh (2008).

1.1.1. Fieldwork Data Collection Techniques and Instruments

Validity and reliability of the collected data and the ability to compare data from previous investigations have greater potential to contribute to the body of knowledge and to answer the initial research questions, thereby potentially addressing a relevant need. Data collection for the first field trip was made possible through a Higher Degree Research Grant from Bond University. Subsequent funding from Professor Craig Langston (Director, Bond University Centre for Comparative Construction Research) enabled a second field trip to consolidate and confirm previously collected data, as well as funding for some of the maps included in this thesis.

Data collection was conducted in three phases in keeping with the aims and objectives of the research. In the first phase archival material and prior research about the traditional architecture of PNG was reviewed. Consequently, the cumulative effects of rapid development, and the colonial dismantling of traditional approaches to living, were examined, specifically related to the built environment. The second and third phases considered the existing model of housing in PNG, the Highlands (Kunguma) and Coastal (Tubusereia) environments respectively, to gain an understanding of what cultural dynamism means in the built environment domain in these areas. Yin (2014) suggests a chain of evidence that links the research questions with the data collected and the conclusions drawn. Therefore, selection of participants was considered to be a critical factor for eliciting details of daily life regarding the participants' definition of traditional architecture in the contemporary context of PNG, and whether lessons can be learned from the norms and values in villages that meet future housing needs generally.

The selection of participants for this research was determined knowing in advance that time in the field would be limited, and that access to participants would be difficult. In the first instance, university research funding did not allow for the expense of travelling to, and staying in, PNG. Secondly, research access to settlements is controlled by the PNG National Research Institute, and there was no response to repeated requests for access. Therefore, the choice of villages (and thus participants) was based on selecting key informants[41] that the author knew personally and who could guarantee access to the villages of Kunguma and Tubusereia see Appendix B).

4.1.3 Key Informants

Because they are usually recognized within a specific group as holding authority, key informants, may have more information to impart or are able to interpret the social context of information in a specific setting. In research undertaken in short timeframes, and with relatively few participants for example, rich information can be gleaned and verified with reference to key informants. Their ability to initiate further channels of information, can potentially add depth and insight to analysis.

For this research, key informants were used to study specific aspects of a cultural setting rather than the cultural whole usually detailed in ethnographies. Therefore, their selection

[41] Key informants are people who, as a result of their personal skills, or position within a society, are experts with particular knowledge and understanding of a community and are able to provide more information and a deeper insight into what is going on in the community.

followed Tremblay (1957) who suggested that key informants should hold formal positions in the community, have knowledge relevant to the study, be willing to share this knowledge, communicate well, and be unbiased or able to reflect upon their own biases (Tremblay 1957: 692). Key informants' status in a community is important because it has the potential to affect the type of information from an insider's perspectives that informants can provide, due to their role in the community. However, there is also potential for key informants to provide a biased view. Payne and Payne (2004) propose that early social anthropologists studying small, isolated tribal societies based their research on listening to tribal elders. Often the social descriptions provided to anthropologists were simplified or narrow views of how these societies worked. Therefore, they warn that '*key informant information must be used with caution. It is better used as a starting point, when informants' partiality can be balanced by further research*' (Payne and Payne 2004: 4).

Nevertheless, using key informants in a limited, focused sense meant selecting people with specialized information and access to the study area, applicable when research in the study of specific aspects of a cultural setting is narrow (Tremblay 1957: 689). It compares with ethnographic usage in that informants were not randomly selected, and a framework of questions with focused objectives (in this case the built environment) were used at the second stage of enquiry. Key informants for this research were born in their respective villages and had lived in and maintained continuous contact with the people in those villages (see Appendix C). Moreover, they were well respected, authoritative figures within their villages. For Tubusereia the key informant[42] was a colleague and PhD candidate at Bond University, while the Kunguma key informant[43], had assisted on several previous anthropological research projects in WHP and was also a family friend. Thus, the preparation, prior selection of participants, and ethical approval processes were implemented well in advance of fieldwork and tweaked as necessary once in the field. The research was completed as indicated in *Figure 4.2*. Research Design Process.

[42] Igo Gari: BA Public Policy and Analysis, University of PNG, MA Public Policy and Analysis, Lee Kuan Yew School of Public Policy, Singapore, PhD Candidate, Planning for Rural Sustainable Development in PNG and the Pacific, Bond University.

[43] Bernadine Danomira: LLB Law, James Cook University. Grad Cert Development Practice, Humanities and Social Science, University of Queensland. Bernadine is a Cultural Facilitator in the Western Highlands, PNG, concerned primarily with social and development issues, gender, health, capacity building and conflict resolution.

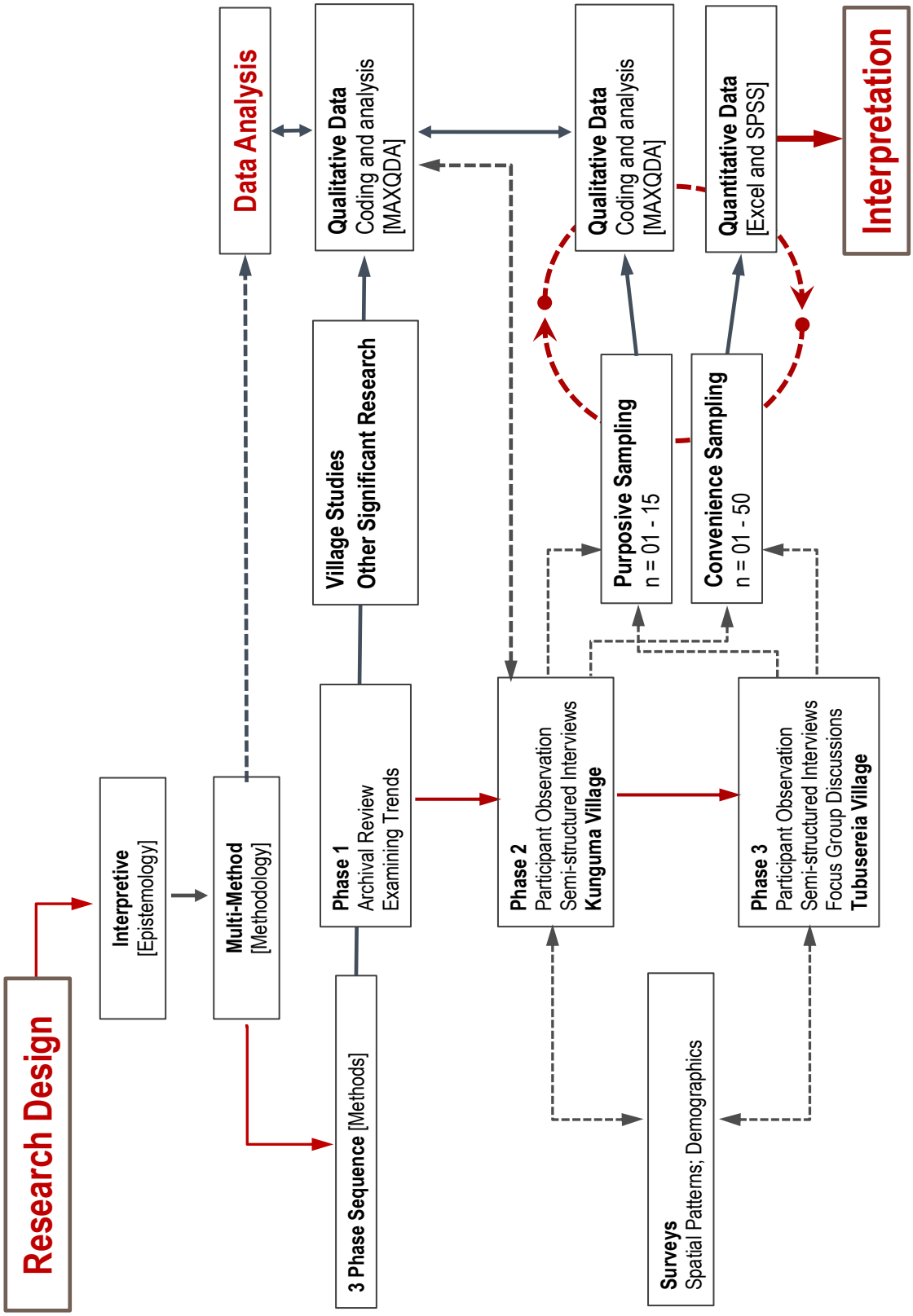

Figure 4.2. Research Design Process.
By author. Compiled from literature by: Groat and Wang (2013); Leedy and Ormrod (2013); Yin (2014).

4.1.4 Survey Instruments

Following the methods described earlier, surveys were developed, tested, and refined based on feedback from a pilot study conducted prior to fieldwork (Appendix D).

Understanding the limitations of surveys in PNG meant that the survey questions were not intended to be distributed; rather they were used as a means of recording observations in the field and as prompts for semi-structured interviews. Nevertheless, the use of Qualtrics (Qualtrics 2016) survey software provided a framework for testing the quality, clarity and logic of the questions and also allowed testing via an email link to the pilot study groups. The survey was comprehensive and, if questions had to be completed online, would have been quite time consuming for participants. However, it was considered that the use of key informants and research assistants to collect responses required some guidance for consistency and a variety of questions that could be applied depending on the level of engagement with an interviewee.

The first tests involved trialling the email link with Bond University Office of Learning and Teaching, for ease of use of the survey.

> *Ease of use and technical aspects were GOOD. All links worked, the calculation tool on some questions' subtotals/totals worked correctly. The questions were in most part clear and logically ordered and unambiguous. This survey will potentially be quite time consuming […] some of the open ended questions will be challenging for you to analyse but the information will be comprehensive and give some good insights into your topic (Long 2016).*

Following refinement of potentially problematic questions and a reduction in the number of questions, a pilot survey was conducted with volunteers from students, staff and key informants who had a connection with PNG or the construction industry, or both.

Two pilot groups were trialled: those with a construction background who would be guided to the builder questions and those from a non-construction background who were guided to the home-owner questions. A minimum of eight participants from each group were trialled with a 100% response rate. The reason for the trials was to test the efficacy of the survey in terms of ease of use, the time taken to answer all questions and the level of understanding of the open-ended questions.

Feedback included concern about the level of literacy of the intended respondents rather than the questions or use of the survey itself (Table 4.1).

Table 4.1
Feedback from Pilot Survey.

Respondent	Feedback
Respondent E.N 8 June 2016	I finished the survey, the survey was very comprehensive, and easy to follow and understand the questions. However, I would say I'm not an expert yet in construction industry, so my answers can be clumsy. Thank you for letting me participate, I hope I helped you.
Respondent D.S. 9 June 2016	Just a question re the short answers, and I don't wish to offend anyone in my assumptions, but will the level of literacy be adequate in all cases to answer some of the questions about design etc? They look fairly detailed. Otherwise it was very straightforward and easy to follow.
Respondent P.T. 16 June 2016	My concern with the partly defined questions, is should a person not have a sufficient level of understanding regarding the terminology (e.g. resources, environmental, political) they may gravitate and select a second choice that is easier to interpret rather than a more suitable response.

Subsequently many of the demographic questions were re-written in *Tok Pisin*[44] (Appendix E) for the Highlands, partly out of respect for those with little English, partly to break the ice and, additionally, to moderate the unnecessary use of interpreters. Reactions from the pilot study participants also provided valuable insights into how to explore the survey responses to help answer the research questions regarding traditional architecture in PNG, in keeping with the original intent of giving voice to participants own perceptions.

4.1.5 Participants

Participants from Kunguma (WHP) and Tubusereia (Central Province), each with a population of approximately 1,000 were selected, although once in the field the Highlands sample was expanded to include participants from an adjoining village, Gatek, because they were helping with the construction documented for this study. It was considered important for this research that the villages should be distinct from one another, due to the nature of a single-case study and small sample size.

Locations are shown in *Figure 4.3* and *Figure 4.4* respectively. In addition, due to DFAT warnings about political volatility during the fieldwork period, urban informal settlements could

[44] Tok Pisin is the vernacular term for Pidgin English, widely used throughout PNG. A creole that emerged in the context of the plantation economy of German New Guinea, to facilitate communication between speakers of different languages (there are more than 800 language groups in PNG), it is now one of the three official languages of PNG along with English and Hiri Motu.

only be visited for brief observation in the company of advisors from the National Research Institute and were therefore excluded from fieldwork and only referenced through literature.

A closed Facebook group was also set up so that key informants, participants, and researcher could collaborate or discuss visual material or previously recorded data because time in the field was limited and telephone access was not always available or reliable. The outcome of using the Facebook group was not so much a conversation as a visual diary, however it did maintain connections that may otherwise have been severed at the end of fieldwork and provided an additional vehicle for the author to confirm or clarify information obtained in the field.

Fieldwork at Kunguma was undertaken from 21 September to 2 October 2016 accompanied by students from James Cook University (JCU), Queensland (see Appendix B), who agreed to share data related to the *Haus Man*[45] construction. *Haus Man* literally means 'men's house'. Broadly, it is used for important meetings and discussions involving the running of community affairs, generally by male leaders.

This project was conceived some time previously to see first-hand what is being built in villages in recent times, and what construction methods and materials are used, while providing JCU students with a project that considered the anthropological aspects of their cultural stay[46]. Fieldwork exercises concentrated on observing the construction of the Haus Man. JCU students participated in an ethnographic mapping workshop by Dr. Rosita Henry[47] and the author, to assist with this research, and were provided with an observation guide (Appendix F) for identifying building form. Access to JCU data also provided a wider scope and more nuanced outlook for this thesis' research analysis. Recommendations and suggestions regarding what

[45] Pidgin English for Men's House. Traditionally each family men's lineage would have one as a gathering place to make decisions that affect the community.

[46] A total of eighteen (18) JCU students were at Kunguma in 2016 and 2017, participating in a New Colombo Plan cultural exchange scholarship. The field school provided students with hands on experience in ethnographic research methods to gain understanding of the social, cultural, economic, and political situation faced by people at the grass roots level in Papua New Guinea. JCU students were joined by students from the School of Humanities and Social Sciences at University of Papua New Guinea (UPNG) in a three-day field school at UPNG's Motupore Island Research Centre, in the Central Province.

[47] Professor Rosita Henry is an anthropologist who has worked, and continues to work, on numerous research projects, with particular ethnographic focus on peoples and societies in the tropical north of Australia and in Papua New Guinea. Professor Henry is Head of Department of Anthropology, Archaeology and Sociology at James Cook University and a Fellow of the Cairns Institute.

should have been included in field notes were introduced through a series of fieldwork exercises (

Table 4.2).

Table 4.2
Fieldwork Data Collection Exercises

Exercise 1 (Mapping)	Detail the layout of a section of the village, house by house; draw a map of the section, annotating it in detail, explaining why the details are worth noting and describing in what way, if any, the village can be understood as 'planned' space.
Exercise 2 (Non-verbal communication)	Note down observations on at least three instances of communication exchange between two or more people. Pay attention to body language or non-verbal communication (e.g. use of space, interpersonal distance).
Exercise 3 (Material Culture)	Record the and/or document other object/s or item/s of 'material culture' in the village and/or assist with and document, each day, the building of a village house.
Exercise 4 (Cultural Practices)	Describe the setting - the size and mood of a crowd at a public event, note any specific language, symbols, material culture, clothing etc. that mark the identity of the event and its participants.
Exercise 5 (Interview)	Conduct brief informal life history interviews with at least two research participants.
Exercise 6 (Survey)	Administer a questionnaire on aged care in the village and/or on housing in the village. At the end of each day, write up observations of events of the day.

Following the Highlands data collection, fieldwork was replicated as closely as practicable at Tubusereia, south east of Port Moresby, from 2 to 7 October 2016. A shorter time was spent collecting data at Tubusereia for two reasons: firstly, there was no opportunity to follow the construction of a traditional village house, and secondly, an accident at Kunguma resulted in a broken hand for this author which prevented much field note writing and required an earlier return to Australia. Consequently, much of the field data were recorded by phone or video, and transcribed on return to Australia, weaving together the various strands of data for coding and analysis.

Although 'classic' approaches to ethnography involve extended time in the field, more recent approaches have sought alternative means that employ participatory and collaborative photographic, video-based and other techniques that are designed to generate empathetic understandings though analysis. These approaches also recognize that long-term fieldwork in one location for extended periods might not be viable in research that investigates the relatedness of people and things of a temporal nature like construction projects (Pink et al.

2010). In contexts such as these (and similarly this research), ethnographic techniques can be tailored to the possibilities and limitations of time, costs, and access.

A second field trip to both villages was undertaken in 2017, to address any significant gaps in the data and clarify uncertain data from 2016. Tubusereia, including Motupora Island[48] were visited from 4 to 7 September 2017, with field observations guided and supported by Dr. Linus Digim'Rina[49], Dr. Matthew Leavesley[50] and Dr Borut Telban[51]. Cultural workshops were also provided by these educators, with the assistance of students from the University of Papua New Guinea and Dr. Rosita Henry at Tubusereia, followed by further field data review at Kunguma from 7 to 13 September 2017. A detailed outline of both field trips is shown in Appendix G.

4.1.6 Research Participants and Sample Design

Selected with the help of key informants, participants were limited to a maximum of 15 from each village, with allowance made for including incidental voices as part of the participant-observer data collection.

Two further delimiters for participant inclusion were:

- village residents who were over 18 years old who were homeowners, and
- were main contributors to the construction process, for example village elders, decision makers, traditional builders, and family stakeholders.

[48] Motupore Island belongs to the people of Tubusereia and lies about 16km off the coast of Port Moresby. It is a research centre for the University of Papua New Guinea.

[49] Dr. Linus Digim'Rina, PhD, ANU; BA Hons, UPNG is head of the Division of Anthropology, Sociology and Archaeology at University of Papua New Guinea. From Okeboma Village Trobriand Islands, Dr Digim'Rina specialises in Study of Human Societies; Melanesian Land Tenure; Theories of Society, Kinship and Genealogy; Economic Anthropology; Indigenous Knowledge.

[50] Dr. Matthew Leavesley has 20 years of archaeological/anthropological experience in Papua New Guinea. He performed the duties of Deputy Dean for the School of Humanities & Social Sciences at UPNG (1998-2012). Research interests revolve around notions of prehistoric human adaptation(s) to environments with reference to case studies in Papua New Guinea (PNG) where he has extensive fieldwork experience since 1998.

[51] Professor Borut Telban is Head of Anthropology Department at the Institute of Anthropological and Spatial Studies, Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU) and Coordinator of Anthropology program at the Postgraduate school ZRC SAZU. His ethnographic research among the Karawari-speaking people of East Sepik Province, PNG has spanned more than twenty-five years. He has focused on Ambonwari cosmology, kinship, social organization, ritual, death, poetics, language, and socio-cultural change.

This provided the benefit of hearing personal narratives from homeowners, as well as obtaining specific information from those involved in the construction process in a more specialist capacity.

Participants were selected by convenience, accessibility, reliability, and a desire to participate. Key informants were invaluable, not only because access to respondents (entering village without prior permission is not possible geographically or politically) was difficult, but also because there were language and cultural barriers to overcome. Therefore, key informants facilitated permissions from village leaders, approached and invited participants prior to fieldwork commencing, and helped with translating in the field. Nevertheless, additional verification and clarification of recordings was cross-referenced and checked by other translators after transcriptions were collated.

4.2 STUDY REGION: WESTERN HIGHLANDS PROVINCE (WHP)

> *WHP has everything that we need: fertile soil, optimal climate, food crops of all kinds, and much more. And the people of the province are exceptionally strong, smart and productive. But pride, prejudice, jealousy, conflict and violence can and do stem the tide of progress (Pastor Max Martin, Christian Leaders Training College, Banz, North Wahgi. Cited in Ketan 2013: 1).*

Western Highlands is one of several provinces in this region of PNG, the others being Enga, Southern Highlands, Eastern Highlands, Simbu, Hela and Jiwaka. Much of the land, thought to have been settled about 9000 years ago is under cultivation, predominantly with sweet potato, taro and yams (Muke, Denham and Genorupa 2007; Denham 2013; Ketan 2013; Golson et al. 2017). Golson et al. (2017) draw the conclusion that house mounds of individual houses studied at the Kuk Swamp[52] archaeological site were similar to those in unpublished data about houses in and around Kuk during Ron Lampert's 1972 ethnographic observation and

[52] Kuk started as an archaeological site but has become Papua New Guinea's first and only World Heritage site. Legislation such as Organic Law on Provincial and Local Level Governments (1995/1997) empowers local communities to generate laws to protect their own cultural and natural resources that are nationally binding. Such laws allow for continuous occupation and ongoing cultivation of the archaeological site to link the distant past with current cultivation practices (Denham 2013: 120).

enquiry (Golson 2017: 330). The individual houses were said to match those in use at the time of Lamperts writing in 1973[53].

The terrain here is notably rugged. Mount Hagen, the WHP capital, is the traditional home of the Melpa. Strathern and Stewart (2017) show, based on figures since Australian explorers first entered the Highlands in 1933, that a process of expansion, decline and migration, over time, determined the demographic balance of tribal groups in the Mt Hagen region. They contend that this is the result of complex effects of warfare in response to imminent or immediate pressures. '*The largest groups tended to offer protection to smaller ones, while driving away others to different locales*' (Strathern and Stewart 2017: 427), as experienced by the people of Kunguma.

The Leahy brothers were said to be the first Europeans to explore the area, primarily in search of gold in 1933 (Connolly and Anderson 1983; Loupis 1984; Leahy 1994), hence Highlanders' contact with outside influences has been relatively recent. The town, established as a patrol post in 1936, is in the Wahgi Valley in the Hagen Range of the Central Highlands.

WHP (*Figure 4.3*) covers an area of 4,299 square kilometres since Jiwaka Province (the Jimi, Wahgi and Kambia areas) was split from it in 2012. In the 2011 census 362,850 inhabitants were counted in WHP, including Jiwaka (National Research Institute 2010; National Statistical Office Papua New Guinea 2017b). At the time of writing these were the most recent published figures. The next census is due to be undertaken in 2020.

[53] Lampert, R.J. 1973. Using ethnography to interpret prehistoric houses excavated in the New Guinea highlands. Unpublished paper presented at 45th ANZAAS Congress, Perth. Kuk archive, Department of Archaeology and Natural History, Australian National University, Canberra.

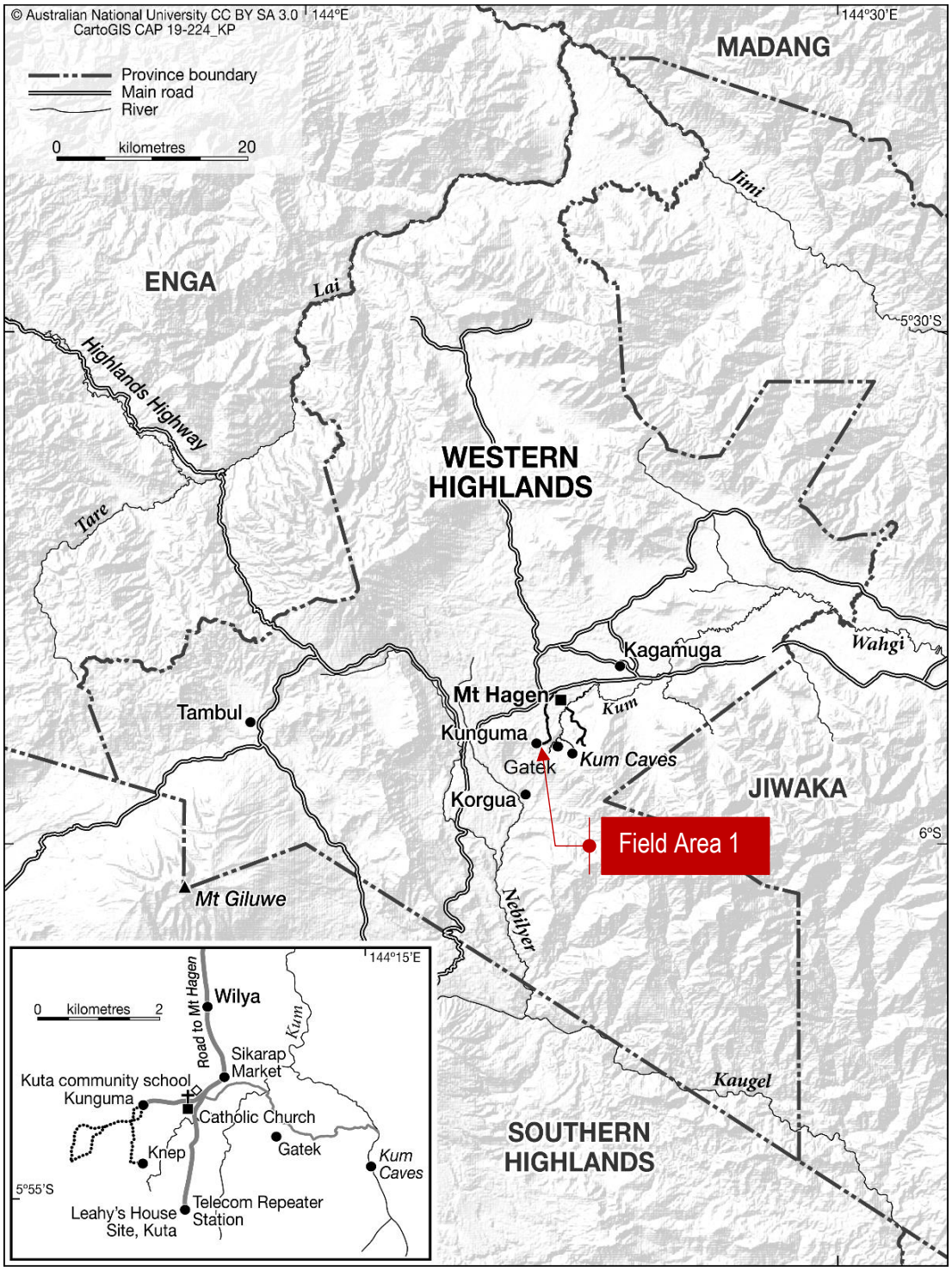

Figure 4.3. Study Region: Highlands.
(Compiled: CartoGIS Services 2016c, College of Asia and the Pacific, Australian National University).
(Adapted by author)

4.3 STUDY REGION: CENTRAL PROVINCE

> *The world around us is changing at a rapid pace and for us as a small nation like Papua New Guinea we are caught up in this trend: Our villages are changing, so are our communities and societies. There are so many factors amongst others that derail our progress and detour us from realizing our full potential as individuals and as a nation. Hence, there are three things that have dawned on me that I think are the brands that cause perceived changes around us. In no order of importance, they are dependency, jealousy and complacency. When shall we be able to resist the transient ways of counter productivity? Do we hear ourselves in the clutters and calamities of these trying times? (Vagi 2016)*

Central Province (*Figure 4.4*) surrounds the National Capital District, the seat of government and the country's capital, Port Moresby. Central Province is located on the southern coast of the country stretching from Bereina in the north to Gaire in the south, extending inland to the Owen Stanley Mountain Range. It has an area of 29,998 square kilometres and, in the 2011 census, a population of 237,016 (National Research Institute 2010; National Statistical Office Papua New Guinea 2017a). Much of the population relies on Port Moresby for work in government or business, or informal trade in fruit, vegetables, fish and betel nut.

The terrain around Port Moresby, situated between the catchment of the Vanapa and Brown Rivers, ranges from hill slopes approximately 200 metres above sea level, to valleys, beaches and mangrove swamps (Kiele et al. 2013).

Port Moresby is connected via the Hiritano Highway to the Gulf District in the north-west, while the Magi Highway extends to the south-east as far as Kupiano, providing access to the second field area of this research, Tubusereia. The areas around Port Moresby are also well served by roads including one to the Sogeri Plateau and the start of the Kokoda Track. However, the inland areas are essentially isolated.

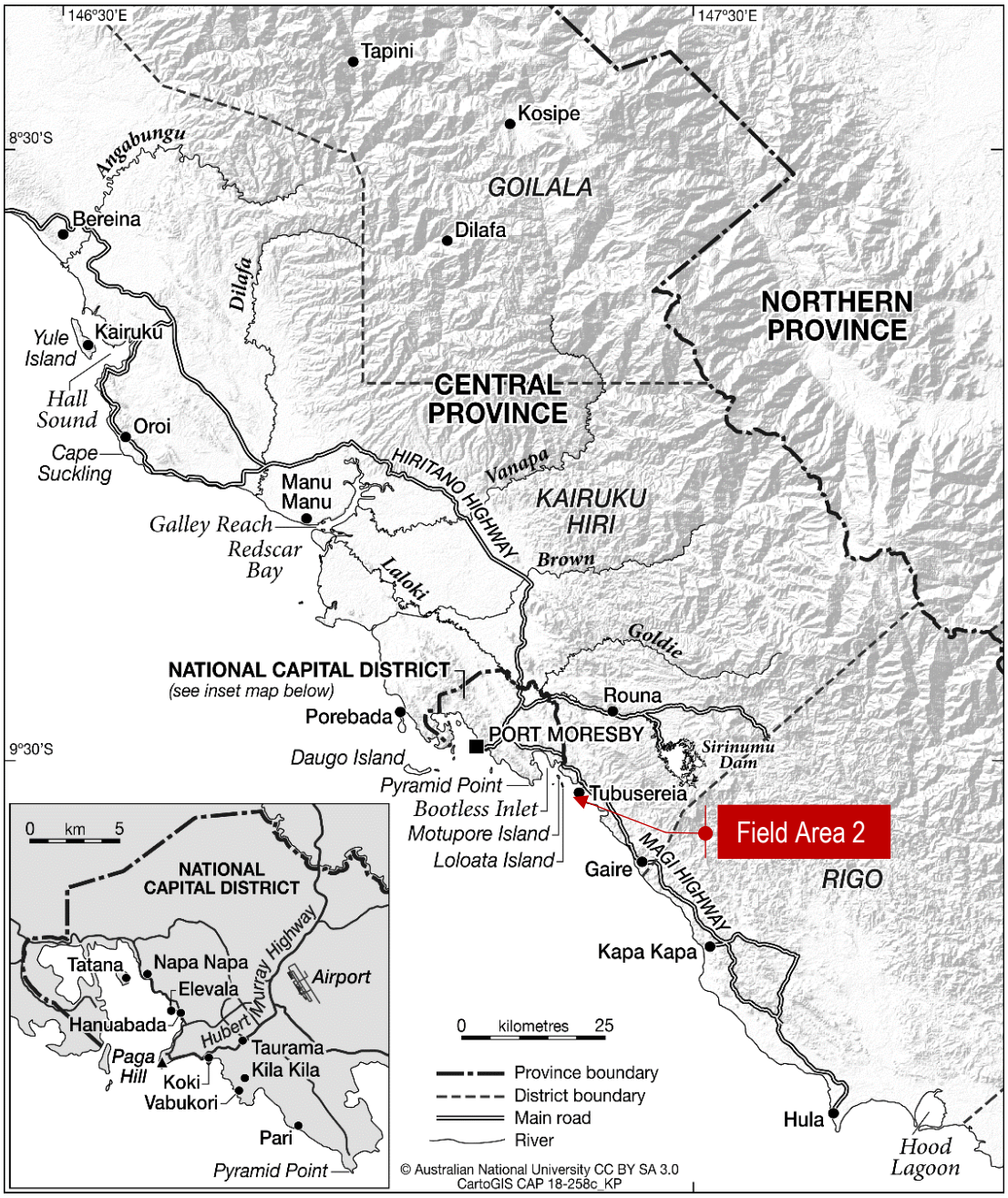

Figure 4.4. Study Region: Coastal.
(Compiled: CartoGIS Services 2016b, College of Asia and the Pacific, Australian National University).

4.4 SEMI-STRUCTURED INTERVIEWS

In-depth interviews were conducted with resident villagers, to collect information on the extent to which Western architectural intervention has been adopted, resisted, or adapted in practice. The interviews were intended to explore the expected and unexpected impacts of transitional architecture and capture contextual issues that may have shaped the uptake and impact of change. Interviews are an appropriate method for investigating these issues because

they enable individual narratives to be elicited as the interviewer can explore what is meaningful to individuals experiencing the effects of changes in the modern context. In other words, as Spradley (1979: 15) suggests, the acquisition of culture cannot be observed directly, but requires listening, reasoning and making inferences about needed changes, in order to provide the information necessary to make such changes. Thus, in-depth interviews provide the means for strategic research.

4.4.1 Consent Process

Informed consent from participants was obtained with signed consent forms (Appendix H), or verbally recorded on tape[54]. Not all villagers at Tubusereia felt comfortable about signing forms, either because of a latent fear of government processes or simply because they are underconfident about their writing skills (Igo Gari 2016, personal communication, October 1). Furthermore, some participants at Kunguma and Gatek expressed concern about having their names in print, strongly suggesting that they felt it may invite the '*devil*' into their lives. Such beliefs, ethically, had to be respected. Bell (2009) explains in the Purari, for example, people may be worried about signing things they do not understand, and which can potentially impact their lives. Although Bell refers to specific experiences like logging and ILG issues, the sentiment can be viewed in a similar way.

Due to the informal nature of interviews, informed consent discussions were conducted with participants at convenient locations such as their homes, gardens, along the road or at a building site. English, *Tok Pisin* or *'Tok Ples'* were the languages used, depending on which one the participant felt most comfortable with, using a translator, as necessary. Tok Ples literally means the talk of the place, i.e. the language spoken in the place being visited, their community language. Goddard (2017: 115) notes that '*as Tok Pisin (the pidgin lingua franca) spread through Melanesia, its elastic term 'ples' was increasingly used by Melanesians to refer to their home place, variously meaning a region, an ethno-linguistic group territory, or a smaller proprietary landscape section*'.

[54] Recording consent in lieu of signing is acceptable for anthropological research ethics on which ethics approval for this research was based.

Key informants at both study areas were fluent in all three languages, and along with mentors[55], were present during each consent process. Moreover, the research program at Kunguma allowed for nightly *Tok Pisin* classes with a teacher from the Kuta school, and the translation of survey questions into *Tok Pisin* prior to face-to-face surveys being conducted, to facilitate communication during the village stay. Expressions of surprise and appreciation during interviews and surveys showed this to be a respectful and worthwhile ice-breaking exercise. Subsequently, it resulted in much hilarity when students presented a play of *'The Three (Five) Little Pigs'* in *Tok Pisin* (with cultural adaptations related to the *Haus Man*) at the village feast (Appendix I). Culturally pigs have a high value in PNG, as a major social and economic commodity.

4.4.2 Introduction to the Interview

Information about the objectives of the interview and overall study was provided to each participant at the commencement of each session. Confidentiality and anonymity were also explained. Each participant was asked to consent to be interviewed and for the interview to be recorded using a digital tape recorder. Participants were also advised that they were free to withdraw from being interviewed at any time.

During each interview, when possible, a tape recording or video was made of the interview and notes taken of the responses and non-verbal behaviour during the interview, as well as notes about the setting and atmosphere of the interview. Data were uploaded as often as internet access permitted.

4.4.3 Team Review Sessions

Informal daily review sessions took place with field researchers (JCU students) and the key informant. The purpose of the review meetings was:

- to update each other on progress with data collection,
- to discuss key findings from data collection, including differences and similarities,
- to discuss how these preliminary findings might feed into analysis design, and
- to get an idea of whether new concepts were still emerging or if saturation had been reached on key topics.

[55] Mentors: At Kunguma, JCU students and the author were paired with mentors who had in-depth knowledge of the students' particular field of interest and in whose homes they stayed, for the village stay. They advised on issues related to cultural norms and daily activities, including the construction of the *Haus Man*.

4.5 PARTICIPANT OBSERVATION

Obtaining insights that may be hard to articulate or pinpoint from interviews due to participants' familiarity with their daily practice, and in seeing how these activities are played out in social and wider contexts, is a significant reason to undertake participant observation. The intention was to observe not only social interactions but also, where possible, housing construction including initial planning, acquisition of materials, site selection, and rationale.

4.5.1 Participants: Kunguma

During the first field trip in 2016, time was spent observing the construction of a Haus Man, following the villagers involved, and participating when invited to do so. The second field trip in 2017 followed the construction of a pit toilet addition and noted internal changes to the Haus Man, such as a sitting platform.

Watching and taking notes to describe activities, interactions, and discourses relating to the construction also included informal discussions with mentors and other villagers. Formal interviews were between thirty minutes and one hour each; they were generally conducted in the early morning prior to construction or early evening after construction, to minimise encroaching on family time, while less formal questions could be asked while working alongside mentors during daily activities.

Although the participants to be observed were identified in advance, there were others who were important to include as the study progressed but who were not anticipated *a priori* to be part of the implementation of the construction. For example, chance discussions with ladies from the village proved invaluable as they also had a role to play, both in the construction process, during which they carried large bundles of *kunai* grass (Imperata *cylindrica*) for thatching, and in preparing the feast associated with raising the central post of the house under construction, which in earlier times was a significant symbolic event. Consent was sought from these incidental participants verbally and recorded on tape or video. These participants were already conversant with the requirements of the research, news having travelled throughout the village by word-of-mouth and, furthermore, because these ladies were in one way or another related to the mentors or builders involved in the study.

4.5.2 Observation Procedures: Kunguma

Observation entailed following the activities of mentors implementing, and interacting with, construction activities. The research captured a detailed description of activities in field

notes and recordings, how these activities were explained and interpreted by different villagers, including how different physical objects and concepts are used, referred to, and enacted in construction practice. The research principally focused on observing activities and interactions but also included asking questions, for clarification, from different villagers about their practices, seeking to bring to light concerns, processes and meanings that emerged from the construction and other associated activities.

For the core participants in Kunguma, a period of ten days of construction was monitored, and informal discussions recorded. In addition, each student researcher spent one night and made daily visits to the home of a mentor, to observe and experience village architectures, their different physical construction, layout, and comfort levels, and to record the residents' specific circumstances. Moreover, guided walks throughout the village and to forests beyond the village proper were undertaken with mentors to see the source of raw materials and how they are obtained when required for building.

4.5.3 Recording Observations: Kunguma

Discussions and informal interviews were manually recorded in field notes, or, if an informant provided more detailed information in a lengthy discussion, digitally recorded for later transcription. These observations provided data for a 'thick' description of the intervention activities in the physical and social spaces that were observed, as noted by Geertz (1973).

More structured observations and discussions were carried out with builders and mentors. The visual observation guide provided to JCU student helpers was used to record data in a systematic format, including the physical form of village buildings, construction methods and family compound layouts. As expected, the responses were of varying quality but nonetheless provided a broader range of personal narratives than would have been possible from only one source. The intent of the participation was aligned with Emerson, Fretz and Shaw (1995: 12) who suggested fieldnotes as a way of providing subtle and complex understanding of those being studied and *'what their experiences and activities mean to them'*.

4.5.4 Participants: Tubusereia

With the intention of replicating the Kunguma study as closely as possible, time at Tubusereia was spent observing several houses under construction in the village and interviewing villagers living both on land and on stilt houses over the sea. This included watching and taking notes to describe activities, interactions, and discourses relating to village housing

and social networks. It also included informal discussions with those involved in construction, particularly a limited few who still retained traditional construction knowledge. In a similar manner to Kunguma, formal interviews were between 30 minutes and one hour each and were usually conducted in the early afternoon.

Once again, although potential participants were identified in advance, there were others who were important to include as the study progressed. Discussions with elders from the village, for example, provided vivid background information about village life before World War II and life under the missions and colonial administration. Diamond (2012) proposes that traces of the past are not erased and replaced, but are embedded in the world of today, providing another reason for wanting to understand the historical past.

Similarly Slagter (2004: 807) suggests the notion of 'path dependence' when considering change, stating that actions of the past have a strong bearing on the present and the future unless another future can be conceptualised and crafted. In other words, certain outcomes are the result of sequences of events that constrain future options. Thus, incidental conversations with elders were important to this research, in that they provided insights previously only available from literature written from an *'outsiders'* viewpoint.

Consent was sought from these incidental participants verbally and recorded on tape or video. As at Kunguma, the participants were already conversant with the requirements of the research, as news had travelled throughout the village by word-of-mouth through the key informant who was related in one way or another to the village elders involved in the study and had explained the research as part of the recruitment process.

4.5.5 Observation Procedures: Tubusereia

Observation captured a detailed description of activities relating to construction in field notes, noting how these activities are explained and interpreted by different villagers. Observation was intentionally close in concept and process to that undertaken at Kunguma to ensure consistency of data through replication. Thus, the research once again focused on observing activities and interactions and asking questions for clarification from different villagers about their practices in relation to architecture.

For the core participants in Tubusereia, a maximum period of five days of village life was monitored, and informal discussions recorded. Accommodation was provided within the village with an elder's family, providing an ideal platform from which to observe and experience village

architectures, their different physical construction, layout, and comfort levels, and to record the residents' specific circumstances, as had been carried out at Kunguma.

4.5.6 Recording Observations: Tubusereia

Discussions and informal interviews were recorded manually in field notes, or, if an informant provided more detailed information in a lengthy discussion, digitally recorded for later transcription. Observation showed initially that two distinct groups existed at Tubusereia: those living on land and those living over the sea. Hence, a focus group interview was conducted specifically to capture data related to participants in houses over the sea, as this was the closest approximation to traditional living arrangements in the area that existed prior to colonisation. As a result, two traditional builders in the village were identified and later interviewed.

Focus group interviews are helpful when it is necessary to obtain perceptions on a defined area of interest, in this case dwellings over the sea, in a non-threatening environment (Krueger and Casey 2000).

4.6 DATA HANDLING AND PROCESSING

To protect their anonymity each participant was allocated a unique identifying alias for interviews and in transcript documents. The format for naming files followed Table 4.3, e.g. IDI_FR_H_04, keeping separate, where possible, in depth interviews (IDI) and participant observation interviews (POI). For details see Appendix J.

Table 4.3
File Labelling Schema

Type of data collection	Gender of respondent/group	Type of respondent/group	Area	Number of interviews
IDI	M F	R = researcher K = key informant S = stakeholder V = village leader M = Mentor	H = Highlands C = Central	01-15
POI	M F	R = researcher K = key informant S = stakeholder V = village leader	H = Highlands C = Central	01-50

Participant observation interviews were generally unstructured conversations undertaken while observing construction or other social activities in the field and, although natural, informal, and spontaneous, were also assigned a number to facilitate identification of different voices when transcribing and referencing quotations.

4.6.1 Transcription

For this study, the transcription method reflects the interpretative approach underpinning the qualitative research, as it strives to convey as fully as possible the experiences and representations of the participants. Word-for-word transcriptions, as well as general summaries of interviews, were produced using MaxQDA software, recording significant hesitations, pauses, utterances, cross-talking and incomplete sentences. However, minor interruptions or hesitations were not recorded to ensure the flow of the transcript supported interpretation and analysis. The transcription was proof-read by both the transcriber and the key informants, for accuracy, to identify any misheard words, and to clarify any areas of confusion or unclear terminology. Proofreading transcriptions is normally the domain of the principal supervisor, but in a country such as PNG it was imperative rather, to have proofreading undertaken by someone well versed in the language and ways of the people being interviewed, specifically to avoid misunderstandings and misinterpretations. Therefore, these tasks were undertaken by key informants with expertise in this area.

4.6.2 Translation

This study recognises the role of translation in constructing knowledge, and the role of translators as active agents in the research process. As such, translators used were familiar with the theoretical perspective of the research as well as its objectives. Translation takes a meaning-based approach from the original language into English. The translators attempted to convey the meaning of the source language within the natural grammar of English. In addition, clarifications were made, where applicable, to capture and interpret meaningful elements of the source material and the way the elements combine to form the meaning of the text. Quality criteria for the translations were comprehensibility (especially relating to culture-specific concepts), appropriateness (in content and approach) and accuracy (faithful to the source text and key facts). Sections of text were double-checked for fidelity and appropriate communication of meaning by key informants, and additional translators familiar with Temboka and Motu.

4.7 DATA ANALYSIS METHODS

4.7.1 Methods

Unlike quantitative analysis there are few definitive guides about the process of qualitative analysis. Although several authors provide guidance on coding techniques (see for example Silverman 1993; Bryman and Bell 2011; Saldaña 2016; Woolf and Silver 2018), each

case is individual in nature and context and therefore requires specific approaches to extracting meaningful evidence or conclusions (Eisenhardt 1989; Yin 2014). Analysis for this research was strongly influenced by the underlying themes generated by iterative review of the data, alternating between emergent readings of the data and reflection on the current literature as suggested by Tracy (2012). One of the techniques used for analysis was thematic coding.

Field notes were coded after return from the field as they were entered into MaxQDA, enabling ongoing analysis and reflection on the purposes and findings of the research. Coding while in the field proved difficult given time constraints, because it was considered more valuable to spend time with village elders, participants, and key informants in their own environments.

Coding grouped the descriptions of observations and informal conversations into themes, to draw out and justify emerging lines of enquiry. On-going analysis was characterised by frequently going back to the original transcripts to ensure text was coded within context. Following the coding process, themes and theoretical constructs were developed from both the field notes and the interview transcripts.

Codes capture summative and/or thematic attributes for language-based or visual data. The first activities of coding processes have been called 'open coding' or 'initial coding' by grounded theorists (Gläser and Laudel 2013) and 'first cycle coding' by Saldaña (2016). Saldaña's notion of 'cycle' centres on a circular reflexive process of qualitative data analysis (Tracy 2012). The choice for this research was to use MaxQDA software as the basis for coding and organising the data, as suggested by Woolf and Silver (2018) and adapted in Table 4.4.

Table 4.4
Five Level QDA Method
Adapted from Woolf and Silver (2018: 27)

Two Levels of Strategy		**Translated into**	**Two Levels of Analytic Techniques**	
1 Objectives	2 Analytic Plan	3 Translation	4 Selected Tools	5 Custom Tools
To identify and analyse changes in housing typologies in villages, with the objective of recognising patterns of existing and emerging house types. To establish a link between traditional architecture, norms and values.	Case Study with two embedded units of analysis using multi-method approach 1 Highlands 2 Coastal Map: Interviews Focus Groups Fieldwork Visual Data	Matching the units of analytic tasks to the components of the software. Formal Equivalence Dynamic Equivalence	Transcribe documents and write output memos. View video document and code segments.	Create document set for each village group for use in code matrix browser to compare.

4.7.2 Data Analysis

Ethnographic field methods were used to investigate changes in PNG housing traditions and to establish underlying reasons for the transitional nature of the built environment and associated spatial patterns. Prior to and while in the field, key informants had direct involvement in advising on research topics, appropriate areas to conduct the research, and in recruiting participants.

While access to archival sources was limited, architectural review of photographic and archival records was used to document and understand historical ephemeral architectural traditions, their social and cultural dispersal, and any remnants of the past that remain significant in contemporary PNG housing. Photographic review thus provided a starting point for analysing the physical architectural form including location and orientation, dominant features of building typologies in different regions, materiality and construction practices, and the significance of transformation on the modern urban fabric.

Yin (2014) suggests essential principles be applied to data collection for a case study of high quality, these being: multiple sources of evidence which converge on the same facts or findings, a case study database, discretion with the use of electronic data sources, and a chain of evidence that links the questions asked with the data collected and the conclusions drawn.

Using these principles helps develop analysis techniques such as pattern matching, explanation building and cross-case synthesis. A case study with embedded units of analysis can also draw upon statistical data to strengthen the analysis of the study. The rationale for quantitative data analysis for this research was based on Gliner, Morgan and Leech (2016), linking the purpose of the research to the type of statistical analysis used and thereby applying one of the principles suggested by Yin (2014) of linking the questions asked with the conclusions drawn. This rationale is shown in *Figure 4.5*.

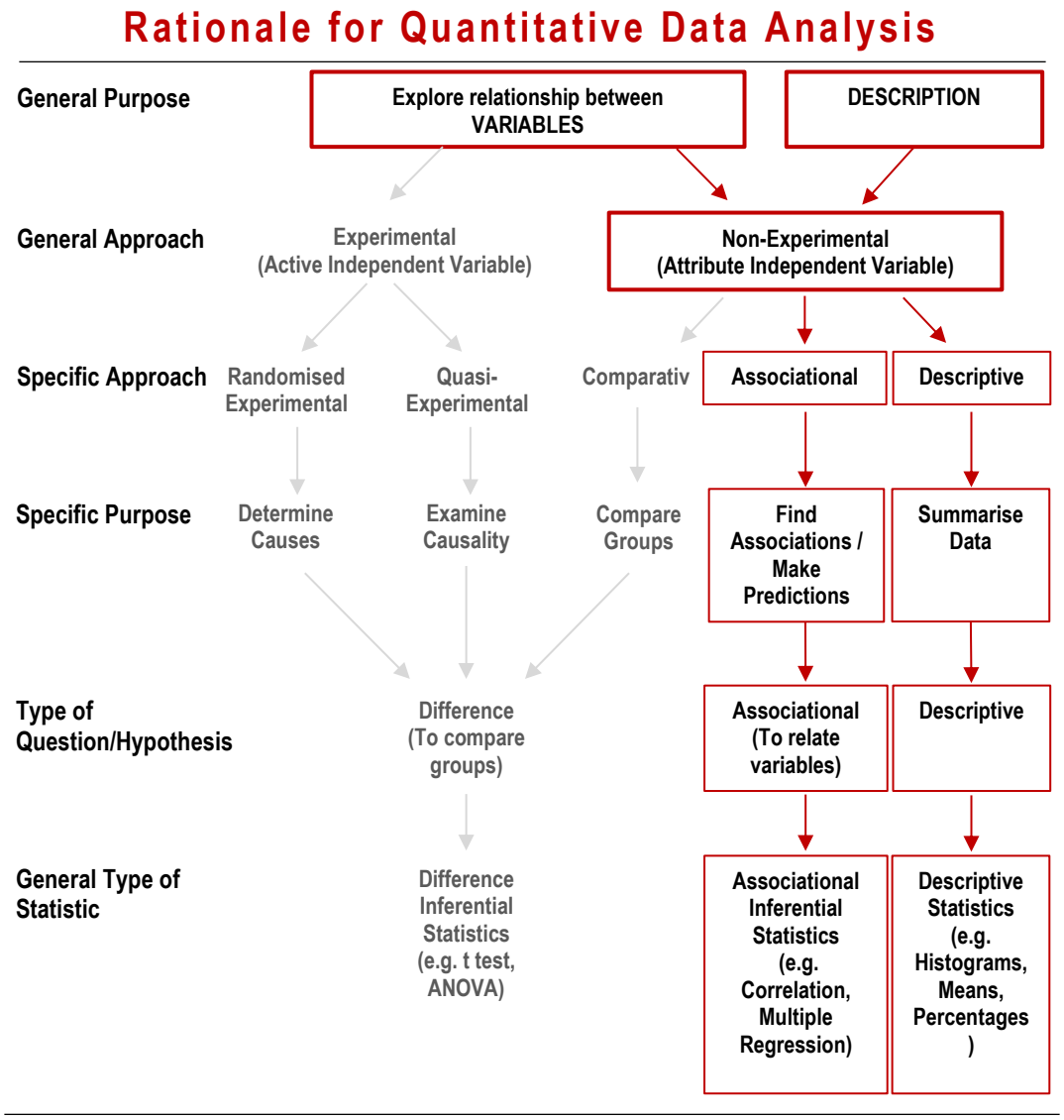

Figure 4.5. Rationale for quantitative data analysis.
Based on Gliner, Morgan and Leech (2016: 335)

4.8 ETHICS AND LIMITATIONS

Ethical clearance for the research was granted by Bond University Human Research Ethics Committee in 2015 Application number 15370. The Ethical Guidelines of Bond University were followed.

Priorities included protecting research participants, anticipating harms, avoiding undue intrusion, rights to confidentiality and anonymity, intellectual property rights and involvement in research. For ethical clearance, this thesis required detailed consideration regarding the vulnerability of participants, as it fell into the study of people in countries other than Australia.

Explanations regarding confidentiality of participants and protection of their data in the dissemination of results followed the guidelines used by anthropological researchers, determining in advance whether providers of information wished to remain anonymous or receive recognition, and making every effort to comply with those wishes. Thus, the first field trip involved participating in an anthropology fieldwork techniques workshop that looked at specific cultural issues in this context, conducted by Professor Rosita Henry.

Anthropologists commonly share their research findings with study participants and solicit their feedback. Viewing confidentiality in a more nuanced way means moving away from the assumption that every respondent wishes complete confidentiality and instead recognises that a research participant might want to receive recognition for some or all of what he or she contributes. Although the research involved working with human subjects, the data collected were related to architecture and the risk for personally confronting data was considered low.

Any social research connects us to those who will use the research in the future, to those whose research we accessed and thus to the wider research community, as well as to those who are being researched. Hence it was necessary to consider the ethics beyond gathering data, to the establishment of bonds with a community, and the moral choices we make, all of which will have an impact on the outcome of the research in question.

> *For those of us who call ourselves academics and intellectuals, however, there is a good reason why we cannot escape 'the West' or avoid the anxieties of modernity. It is that our very activity, in thinking and writing, is underpinned by a belief in the absolute worth of disciplined, rational inquiry. […] it is to this belief that the terms 'Western' and 'modern' refer. And however much we may object to the dichotomies to which it gives rise, between humanity and nature, intelligence and instinct, the mental and the material, and so on, the art of critical disputation on these matters is precisely what 'the West' is all about (Ingold 2000: 6).*

Research challenges us to define individual moral principles and to be vigilant in not misrepresenting sources or results of data that may be important for those who follow. Concern for the integrity of the research, conducted with the best interests of others in mind, was therefore paramount. No specific or unexpected ethical challenges or problems arose during fieldwork.

4.9 CONCLUDING REMARKS

In summary, this chapter links the method of research to its analysis and findings in the following chapter using both qualitative and quantitative data.

The interpretive, multi-method research design incorporates both data types which are analysed separately and then synthesised to facilitate interpretation of the results. The findings and conclusions are then aligned with what has been learned from the literature review to elaborate on the drivers for uptake or abandonment of traditional architecture in PNG.

Using multiple sources of evidence, has the benefit of extending a case study over a longer period of time and provides a firmer basis from which to draw conclusions, despite using a single-case study with embedded units of analysis (Eisenhardt 1989; Merriam 1998; Yin 2018). Archival documentation, of patrol reports for example, provided comparative historical references. Sources included the Fryer Library, the Australian Museum, Macleay Museum photographic collections, National Anthropological Archives of the Smithsonian, NSW State Library, Pacific Manuscripts Bureau for various manuscripts relating to the Pacific Islands, UC San Diego, Wollongong University, Nashos, National Library of Australia, and the Papua New Guinea Association of Australia.

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Chapter 5: Case Study Results and Findings

5.0 INTRODUCTION

> *We are not talking a language of cause and effect. […] Identifying, sifting through, and sorting through all of the possible factors showing the nature of the relationships does not result in a simple 'if . . . then' statement. The result is much more likely to be a discussion that takes the readers along a complex path of inter-relationships, each in its own patterned way, that explains what is going on (Strauss and Corbin 1998: 130)*

While the preceding chapters provided introduction to the thesis and outlined the theoretical framework, design, and methodology, this chapter presents the data gained from focus group interviews, semi-structured interviews and field observations. Based on the stages of the study, data were analysed to explore the main research question, initially separating the different study areas then integrating them for later analysis and interpretation.

In keeping with the research design, qualitative and quantitative data were analysed through an interpretive lens because it accounts for the view that phenomena are constructed by human experience. Subsequently, the combined results of the individual embedded units of analysis established the outcome of the research findings and the recommendations resulting from those findings, to answer the research questions:

- *What defines traditional architecture in the modern PNG era and how and why has it changed in the places in which it is anchored?*
- *Can lessons be learned from the remaining traditional buildings to inform building design and construction that can better serve modern PNG in areas where Western influence and the aspirations that it has generated have largely displaced traditional norms and values?*

This chapter details the specific field sites and composition of study participants and presents findings in relation to the aims and objectives of the research stated in Chapter 1.

The findings are presented with reference to a general overview, followed by two sequential sections related to more detailed data from the two main field areas of Kunguma and Tubusereia, including participant interview quotes, photographic evidence from the field sites, and finally concluding remarks.

5.1 GENERAL OBSERVATIONS

Architectural change as it occurred in PNG shows the transition of housing over the past 100 years and what it looks like now; a multi-level, multi-dimensional mix of traditional, informal and squatter settlements as well as developments subject to formal covenants. While traditional enclaves are anchored in villages, both rurally and within urban boundaries, informal and squatter settlements should not be considered merely a problem; rather, this is where most urban people live (Tanim Graun 2014) due to a variety of factors beyond their control, but also because it allows retention of tribal and village connections and the safety net that this affords.

Defining traditional architecture in the modern PNG era, the reasons for, and the extent of architectural transformation, shows a disparity between the Highlands and Coastal villages of this research in terms of form, materiality, and village layout, over and above the differences in regional variation prior to colonisation. That is, the extent of transformation appears to be directly proportional to the length of contact with external influences, both Western and inter-tribal contacts.

Some cultural norms are nevertheless also common to both groups and have persisted in many households. These include similarities such as cooking over an open fire either outside or in a separate *Haus Kuk*, the inclusion of a separate hygiene area detached from the house, and the multi-generational grouping in households generally.

Moreover, there was little evidence of grand ceremonial architecture in either region, despite the apparent significance of these buildings in earlier times in other areas of PNG (see for example Bateson (1958) and Hauser-Schaublin (2015) in the Sepik area, Williams (1924; 1940) in the Gulf district and Seligman (1910) in Central Province). Ceremonial life among the Motu villages around Port Moresby and Tubusereia in the early 1900s centred around an elaborate rectangular platform supported on four massive, carved wooden uprights. The structure, called a *dubu*, was used as a meeting place for men to discuss serious matters and were thought to have sacred and spiritual significance, although Seligman (1910: 18; 62) suggests that customary use of the *dubu* was obsolescent in many villages before the advent of European influence.

An earlier example of an abandoned *dubu* from Lawes (1890a) is shown in *Figure 5.1*. Some platforms were still in evidence in the 1960s, but none were observed during fieldwork in 2016-2017.

Figure 5.1. 'Native' Sacred Place or Feasting Platform, Tupuselei ca 1890.
Lawes (1890a). Available from: OMNIA, University of Southern California Digital Library.

In the Highlands during fieldwork conducted in the Upper Jimi district, Milani (1998: 9) documented the construction of a ceremonial building in preparation for a pig-killing ceremony along with a second smaller symbolic hut, '*Boylim Gar'* and long guest houses on the periphery of the ceremonial grounds.

Figure 5.2. Bolyim Gar symbolic ceremonial hut 1980.
O'Hanlon (1980). Available from The British Museum Collections
A thatched roof *Bolyim* hut built as part of the Pig Ceremony. Waghi Valley, Papua New Guinea.

Similarly, Strathern and Stewart (2000: 70) discuss the construction of a temporary special ceremonial and residential longhouse constructed both for a pig-killing festival and as a kind of 'cultural revival' in 1979–80, in the Wiru speaking area of the Southern Highlands Province. Nevertheless, they posit that it was of a type borrowed directly from the Kewa, who in turn had perhaps copied it from other groups. A similar structure, built around the same time, is shown in *Figure 5.3*.

Figure 5.3. Pumbarol Long House 1973.
Reproduced with permission: Gammage (1973) Pacific Manuscript Bureau.

Jones (2012d) suggests that contemporary men's houses in the Eastern Highlands could hardly be differentiated from other grass-thatched houses around it, but that its understated prominence had clear meaning to those who understood its relevance and significance despite its simple, functional appearance. The same seemed to be the case for Kunguma at the time of writing. Elders and key informant at Kunguma claimed that the *Haus Man* was the only significant building in their living memory. The underlying sentiment attached to the meaning of certain buildings, although not always visibly evident, is verbally expressed in unexpected situations.

> *Bernadine was in Moresby to give birth […] Her Penambi Wia kin were overjoyed when they heard it was to be a boy. Rita said, 'Between you and Olivia, you will have enough boys to establish your own haus man among the Penambi'. (Henry 2019: 185)*

Feelings of delight expressed at the birth of Bernadine's son in 2009 were about the future possibilities for the establishment of a new 'lain'[56], the physical manifestation of which became the *Haus Man* documented for this research.

5.2 CASE STUDY 1: KUNGUMA VILLAGE WESTERN HIGHLANDS PROVINCE

> *Sitting on 'my mountain,' looking down into the Wahgi Valley, the splendour never ceases to amaze me. My husband always says he never gets tired of the view and I know why, for him there is always something new to see, fire burning in the distance, a new patch to add to the garden quilt, a new home being built or just the way the sun decides to shower on a certain part of the valley; for me the view is heart-warming, spirit lifting and hope filled. Praising God that I was gifted this life […] I have visited some places in the world, in some I have stayed a while, but none fill my soul like, 'my mountain'. I wonder if it is because my Api (Grandmother) buried my belly button under an Unt Wanep tree (Danomira 2019).*

Kunguma Village, Kuta Ridge, is located 9 kilometres from the city of Mt Hagen at an altitude of about 1,890 metres. The village land overlooks the Wahgi Valley and the city of Mt Hagen, the provincial capital of the Western Highlands. Kunguma numbers about 300 households, although this number is to an extent fluid. The road from Mt Hagen is a somewhat tenuous link; for the most part unsealed, subject to landslides, and requiring four-wheel drive vehicles to navigate the rugged terrain, like that described for the drive to Kilima[57] in the nearby Nebilyer Valley.

> *The road out of Mount Hagen deteriorates by the mile, the pitted blacktop of the little city crumbling to dirt before collapsing into reddish ruts scraped through the deep green of Papua New Guinea's highlands. In the final stretch before Kilima, a bedraggled coffee plantation in the Nebilyer Valley, our Toyota Land Cruiser has to crawl in low gear, wobbling and tottering through craters and washouts. (Flynn 2018: 1)*

[56] Lain: family lineage. At Kunguma this is by patrilineal descent, however this is not the case in all areas of PNG. The term haus-lain, 'line', village, or community are often used synonymously. In the Western Highlands, as in the Eastern Highlands, villages are made up of several houses, spatially organized around a central men's house (Jones 2012d: 31-32).

[57] Kilima: one of the first coffee plantations in the Nebilyer Valley, WHP, Kilima was part of the trilogy of anthropological films about the Leahy brothers, *'First Contact', 'Joe Leahy's Neighbours' and 'Black Harvest (Connolly and Anderson 1983; 1988; 1992).* Descendants of the Leahy family also have close clan links to Kunguma.

Parts of the road to Kunguma have been hand built by villagers, disenchanted with government inaction (Poiya 2013), yet wanting to be able to get their produce to market, and their children to high school (*Figure 5.4*). Many people walk the distance, carrying heavy loads, or, when they have money, catch the PMV (Public Motor Vehicle).

Figure 5.4. Mt Hagen to Mt Kuta road construction.
Source: Poiya (2013).

Nonetheless, on reaching Kunguma, it is evident that there is little need to leave the village on a day to day basis, as food staples, such as sweet potato, yams and greens *(kumu)*, are readily grown.

Like many Highland villages, Kunguma is perched on a ridge, spread out over a large area with houses dotted throughout, surrounded by gardens and the rainforest beyond. Clarke (1971), described reasons given by his Maring informants for locating housing on ridges variously, two reasons being knowledge of the way their fathers and grandfathers built, and because they like to look around to see their places and to know who is coming. Clarke also contends that the crests are exposed to cool breezes during the day, while the nocturnal flow of cold air descends to the valleys below Clarke (1971: 100).

During his fieldwork among the Central Enga, north west of Kunguma, Feachem (1973: 34) also remarked on the positioning of villages, describing them as '*hamlets'* with small groups of houses scattered over the clan territories and typically located on terraces or slightly elevated locations in dense groves of trees around a focal point such as a church, a store or a ceremonial

ground. Mountain ridges with steep gullies on either side are traditionally preferred for security reasons (Milani 1998). A similar theme was expressed earlier by Grey (1979) about the Chuave of the Eastern Highlands.

> *Traditionally Chimbu villages were scattered over a wide area. The men's house was located in a position of high elevation, central to the sub clan territory. Women's houses were built on the boundaries of their gardens which were often up to two miles away from the men's house. […] The tradition of building along a ridge was based on the need to site the men's house in an elevated position, good for defence (Grey 1979: 2-4).*

Beyond the mountain ridges and deep valleys are waves of distant ridges, sometimes clearly defined against the azure sky and sometimes dim through mist and cloud as the afternoon rain showers descend, bringing with them the cold evening winds. The village conjures images of houses with woven walls and thatched roofs, verdant gardens cloaking every available space in a seemingly haphazard fashion, and the easy companionship of extended family living. The main village area is shown in *Figure 5.5*.

Figure 5.5. Study Area: Kunguma Village
Source: By author (drone pilot Richard Stegman).

5.2.1 Kunguma Built Environment

Notwithstanding the generally accepted view of round houses as 'typical' Highlands housing, a range of forms existed historically and are still in evidence (Clarke 1971). Round, rectangular, rectangular with apsidal ends, and long houses are all constructed using a

combination of traditional and/or non-traditional materials (there are many metal-clad buildings, which include funerary houses, i.e. small buildings to 'protect' the remains of the deceased).

Figure 5.5. Newly constructed funerary house.
Source: author (2016).

In addition to residential buildings there are a noticeable number of churches constructed either entirely by villagers, or with money raised by villagers. Catholic, Lutheran, Assembly of God, Four Square Revival and Seventh Day Adventist churches are represented in the village. Notably, anecdotal evidence suggests, only one family attends the SDA church on the grounds that it advocates no pork consumption, an idea alien in a society where pork is the main source of protein, wealth accrual, and ceremonial exchange.

Funds and labour for the construction of churches, are provided by villagers who follow each religious organisation. It also includes housing and support for those church ministers and their families who reside in the village.

Residential buildings generally have a widely dispersed settlement pattern, corresponding to the intense emphasis on gardening and pig production for subsistence living, wealth accumulation and/or prestige. Both in-depth and participant observation interviews as well as surveys were conducted during fieldwork at Kunguma, as noted in Chapter 4, with details provided in Appendix J, Fieldwork Demographic Data.

A separate focus group interview was conducted with village-stay mentors and key informants and their families to ascertain the range of family compositions in each household (Table 5.1). Access to mentors with a more in-depth knowledge of the whole community afforded the opportunity for more frank responses.

Table 5.1
Survey Composition Kunguma

Location	Participant	Age	Education Level	Household
Survey conducted on 27 September 2016 at Kunguma, PNG. Nineteen people participated (seven females and twelve males), including a key informant/translator who was from the village, several mentors, and village leaders.	IDI-MM-H-14	50	Trade	4 adults 2 children 12, 14.
	IDI-FK-H-02	35	High School Gr 10	2 adults 2 children below 10
	IDI-MM-H-15	23	Vocational	2 adults 5 children below 16
	IDI-FM-H-04	28	Little or none	1 adult and 6 children below 15
	IDI-FM-H-03	32	Vocational	5 adults 4 children below 15
	POI-MS-H-76	35	Little or none	2 adults 5 children under 12
	IDI-MM-H-16	60	High School Gr 9	7 adults
	IDI-MV-H-01	52	Little or none	2 adults 4 children under 13
	IDI-FM-H-05	20	Little or none	3 adults 2 children under 13
	IDI-MV-H-04	45	High School Gr 10 Kopi Councillor	6 adults 1 child 2
	IDI-FM-H-08	31	Primary School Gr 6	1 adult 5 children under 14
	IDI-FM-H-01	40	Primary School Gr 6	2 adults 3 children under 10
	IDI-MV-H-02	70	Little or none	2 adults
	IDI-FM-H-06	35	Little or none	1 adult 1 child
	IDI-MM-H-15	40	Little or none	2 adults
	IDI-MM-H-09	53	Little or none	2 adults 2 children
	IDI-MM-H-10	48	Little or none	4 adults 3 children
	IDI-MM-H-12	33	Vocational	2 adults 3 children
	IDI-MM-H-07	40	High School Gr 10	2 adults 2 children

Although surveys are useful, it is difficult to establish a true picture of household composition in terms of numbers. Of the group in Table 5.1 for example, it would seem that IDI-FM-H-08 was a single adult with 5 children, whereas follow up interviews showed that this participant was a younger co-wife. The two wives' relationship was fractious and thus, although her house was close to her husband's, he resided primarily with his first wife. Nevertheless, one of the reasons to have a co-wife is to reduce the workload for the first wife by contributing to gardening and pig production, thereby increasing the accumulation of wealth and the husband's standing in the community. In this case, the first wife already had her own home and, as a contributing member to the household for some years before her a co-wife, was in control of her own money and therefore her own living arrangements.

Building is a collective activity that ties the community together and is part of the traditional system of exchange which, in the Mt Hagen area, is known as *moka*.[58]

Housing typology does not appear to have changed significantly when compared to earlier studies (Ross 1936; Read 1954; Loupis 1984; Milani 1998; Golson 2017), however there is evidence of gradual change in both function and form. As noted in Table 5.2, lifestyles have changed, and the desire to move along with *'modern civilisation'* means that people feel comfortable about making individual choices for housing, whether traditional or, as described below, '*semi-modern'*.

Table 5.2
Interview: Kunguma Housing Typology

Participant	Transcript
IDI-MM-H-14	Traditional there wasn't any square houses, but there were rectangular like this one or longer, or really long like up to maybe here (indicating a span of three houses) at head the woman would live in it, sleep in it and the longer they came they had bunks for the pigs to live in but that doesn't happen anymore now. Now they've separated; pig [houses] for pigs and human for humans and all that. The long houses here were built for the pigs. And at the edge of it the woman would be ... there would be a room for the woman ... to look after the pigs and feed them. But we don't ... you know ... times changing. We don't do them anymore; we don't live with the pigs anymore now[59]. Nowadays they've adopted another new system of building houses. Now I've seen people doing houses with five corners. It's like the round one but it's not round. It's got five corners or seven corners you know; is the latest one they're doing now. And that's the new type of huts they've come up now these days. It wasn't built in the old days before. It's today's people who are building these types of huts. But most of the people are attracted to building semi-modern houses with the iron roof on top, maybe blind on side so everybody is toeing along with the modern civilisation.

[58] *Moka*: a complex system of exchange described in detail by anthropologists in the Highlands area (see for example Salisbury 1957; Bulmer 1964; Strathern 1971). In its simplest form it is an exchange of gifts and services between kin and close associates or friends. The acceptance of any such gifts implies a moral reciprocal obligation either immediately or at a future date. The system extends to property, food, time invested in community activities and, potential future caring of the elderly or infirm. Each gift or service is remembered and counted at appropriate times such as bride price and funerals. Often it is used to garner support in times of crises (Henry 2016, personal communication).

[59] Marie Reay (2014) proposed that it was also a way of preventing promiscuity in married women. Traditionally the pigs, and the taboos associated with them, served to chaperone the woman in the absence of her husband. Pigs were thought to be sensitive to the smell of human semen and to sicken and die in response to it (*'Wives and Wanderers in a New Guinea Highlands Society'* edited and published in 2014, from a manuscript possibly written in 1965).

Most houses are built on a compacted earth floor with a scattering of dry grass or banana leaves on top, although modern iterations now extend to concrete slabs on ground or houses raised on stumps as shown in *Figure 5.6*, *Figure 5.7* and *Figure 5.8*.

Figure 5.6. Modern sheet metal house, 2011.
With permission: R. Henry. This house is on a concrete slab, rectangular in form and with louvre windows. Extensions are underway, with an entry porch partially completed.

Figure 5.7. Traditional thatched round house and adjacent rectangular house.
With permission: R. Henry, 2011. Note the lack of windows which was common in earlier times but also continues in the contemporary context. The diamond weave pattern of the walls was said to be the most popular in this region.

Figure 5.8. A semi-modern home, 2011.
With permission: R. Henry, 2011. Although the walls are woven from split bamboo and the roof is thatched in the traditional manner, the house is raised off the ground and has windows incorporated.

5.2.2 Common Characteristics: Kunguma

Open fires (ringed with stones or enclosed with found objects like old drums) are kept burning continuously while houses are occupied (*Figure 5.9*). The smoke from these fires rises to the roof and seeps out through the thatch. Most fires are built in the centre of the room because this is the best way to evenly distribute the heat and because the construction materials are highly flammable. There is often a suspended slatted timber frame over the fire that prevents the rise of embers while also providing a place to keep firewood dry. Cooking is generally over a wood fire regardless of whether there is a separate *Haus Kuk.*

Water for cooking is generally carried from a nearby stream or river, or in some cases irrigation systems using bamboo piping. Some houses with metal clad roofing have water tanks or small drums in which to collect rainwater, for both cooking and bathing but it is still uncommon at Kunguma.

Figure 5.9. Kuipa Tugl prepares breakfast of roasted sweet potato in his *Haus Kuk*.
Source: By author.

There is a full range of settlement patterns varying from close nucleation of family groups to wide dispersal of individual family homes. Clans can consist of a series of smaller sub-clans, as is the case here, making it difficult to confirm clearly recognisable boundaries. Land can be individually claimed by men within the group while land not in recent use is generally regarded as having reverted to group property. Although field observations indicate that individual actions and personal decisions are significant factors when it comes to housing, largely affected by changes in family relations, kinship dictates use of the land and its distribution.

Many factors determine where a house should be built. It should be a socially meaningful and identifiable space, the use of which will not cause disputes within the community. The location should exist as an historical emplacement within the landscape which, if used without tacit understanding of the larger framework of community, could result in a house not being 'properly' built.

The community birthing house in the village is one example of a structure not 'properly' built, as noted in the following participant transcript. Completed with funding from Rotary and AusAid, the facility has never been used (see *Figure 5.10*).

Figure 5.10. Abandoned Birthing House 2016.
Source: By author

Table 5.3
Interview: Birthing House Abandonment

Respondent	Transcript
IDI-FR-H-11	They didn't make it properly that's what she said. They didn't make it properly.
IDI-FK-H-02	That's an interesting, deep thing to say like ... it's not just they didn't make it properly as in 'build' it properly, they didn't make it properly means more than just building. Sometimes people say things and actually it's got a level of meaning underneath it.
IDI-FK-H-01	So, well my understanding of it was, it was a building funded by Rotary and it was a building ... a birthing house for women to give birth and AusAid I think put money into it ... Yeah ... and anyway there was a group of women involved in organising it and running it and mum was part of that group and ...So, they had to fundraise, they had to do things like kaukau gardens or something to raise money to get it started, or to do some work with it ... and then the money went missing ... some of the money. And then they had a big falling out you know ... and nobody was happy about it and then ... it's just been sitting there for the last about 20 years ... idle.

Although the theft of funds was one proposition put forward for the concept of the birthing house not being properly built, discussions during the team review illustrated the dichotomy between responsibility to the village and the possessive attachment to individual land. Because the birthing house was a community effort, and constructed on community land, it belongs to everybody and at the same time, nobody. People own their houses; they build them, and they own them, but this creates a tension between communal and individual ownership of things.

Contradictions between exclusive and inclusive conceptions of property among speakers of Temboka (Tembagla) in the Western Highlands, were explored in a case study on the Ganiga people and their neighbour Joe Leahy (Henry 2013), the subject of the documentary films Joe Leahy's Neighbours (Connolly and Anderson 1988), and Black Harvest (Connolly and Anderson 1992). As Henry explained, continuing engagement in exchange transactions with customary landowners reinforces the identity of land as inclusive property based on an established social relationship. Therefore, while individuals may have exclusive rights to a portion of land, in practice the land remains inalienable, '*as through gift transactions, land value is continuously transformed into place value, the value of place as a form of sociality, imbued with social relations*' (Henry 2013: 289).

Consequently, if somebody attempted to move into the birthing house building, or took steps to reinvigorate the original project, there would be suspicion as to their motives; the impasse is unlikely to be resolved. Moreover, although the land for the birthing house was offered willingly, and the women all worked together with the men as a communal venture, the opinion was that it may never have been used for birthing, partly due to its prominent location.

Table 5.4
Interview: Birthing House Unsuitability

Birthing House Reasons for Unsuitability	
IDI-FK-H-01	I personally don't think they would have gone in and had their babies. Because I think having your baby is kind of a secret thing … people don't tend to … it's not news. It's not like … a shared experience.
IDI-FK-H-01	It needs to be clean. You need to have running water, you need … I don't think they would have felt comfortable going there and having their baby because it's right in the middle of the singsing[60] ground, like right in the middle of where people come and have meetings and all of that kind of stuff and so they're going to feel … you know … embarrassed.

There was also doubt that there was a need for a birthing house in the years following the abandonment of the project. Some participants expressed the opinion that times have changed. Although at one time there was provision made for birthing, that was no longer the case by 2016. '*Mum said to me when I was growing up that they used to have a special hut built*

[60] Singsing ground: public ceremonial ground (Henry 2019: 209). Used for ritual celebrations and exchange transactions (bride price, funerals and the like). Ceremonies were important in establishing the relative social status and prestige of individuals and groups, by impressive displays of people, pigs and valuables. The power and influence of individual leaders were judged by their ability to exert control over the proceedings and to direct the distribution of items exchanged (Strathern 1966; Boyd 1985: 333).

… a birthing hut away from the village, but now they don't have that. It's changed' (Danomira 2016, personal communication, September 28).

Descriptions based on verbal accounts, as previously noted by Andrews, Squire and Tamboukou (2013: 1), present different and sometimes contradictory layers of meaning. *'Papua New Guinea style: concealment and revelation for all things,'* succinctly describes the problem of discerning meaning related to social and cultural norms in PNG – everything is hidden, or has hidden meanings, which can be revealed when desired (Leavesley and Telban 2017, personal communication September 05).

'*Another aspect of concealment is concealment of thoughts. People say that you can never see into one's insideness (inner state) until a person reveals his or her thoughts by talk or deeds. That is how a person can then be judged as a generous person (on the basis of constantly, over time, giving things away). One's character is revealed by his or her doings over time, by showing the way'* (Telban 2018, email January 11).

Locating a building on clan[61] lands is thus subject to collective cultural values. Without an adequate understanding of what those values may be, even the best intentions may not eventuate in the best outcome, particularly when considering change over time and, as in the case of the birthing house, when the disquiet surrounding it is not openly discussed.

Prior to the construction of a new village building, elders of the village collectively agree on the location's suitability and supervise the work of gathering and preparing the building materials. The younger men contribute most of the physical labour, collecting material from the bush within a radius of five to ten kilometres.

Use of the forest on clan land is permissible for anyone of the clan, however if any land has been previously cleared or farmed, permission must be sought before any materials can be taken. In general terms at Kunguma, once land has been cleared and farmed it is considered owned by the person who has worked that land. Ownership however, as noted previously, is

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[61] Strathern (1971: 21) describes 'clan', as "a level of central importance in political action. It is within the clan that men most regularly refer to and address each other as 'brothers'. Clansmen have a special responsibility for taking blood-revenge and paying compensation for killings inflicted in warfare. They organise *moka* exchanges together. They possess, and are settled on, a single territory, except in cases where segments of the clan have migrated, to colonise a new territory or to return to a previous one.

The importance of the clan was recognised by the Australian Administration when it first set up Local Government Councils in Hagen. Each clan had its own Councillor, unless it was very small, when an attempt was made to combine it with an allied group."

subject to inclusive conceptions of property and dependent to some extent on the continued exchange relationships associated with working the land and its production. Moreover, items are also categorised as either individual or common property regarding material selection. Those which take some time to grow, for example trees for posts, are differentiated from more readily available and renewable resources such as grasses for thatching or weaving.

Gathering of materials for a house is a community effort that starts with the family unit. Obtaining the timber and vines from the rainforest is generally undertaken by men, as is cutting the *pitpit* (Miscanthus *floridulus)* for weaving and the *kunai* for thatching. Women help with carrying and grow additional produce in their gardens to earn money for things like nails or other items that need to be purchased. Depending on what other responsibilities the family has, these preparations can take many months. Surplus produce needs to be taken to the market and sold, and items are bought as money generated from these sales becomes available.

Table 5.5
Interview: Kunguma Material Procurement

Material Procurement	
IDI-MR-H-08	If you wanted to cut a tree down to use is there anybody you have to go to talk to before you cut the tree down?
IDI-FK-H-01	Everyone knows whose land it's on so you'll know where you can cut your posts ... so everyone knows where their land is so they'll know whether they've got posts on their land that they can cut for their house or if they need to ask someone if they can go there they'll ask. But it's not like you go to a certain person.
Researcher	So, if for example someone just cut somewhere else it is seen as a sign of aggression?
IDI-FK-H-01	Yes, you'd be in big trouble. You can't ... especially because how many posts do you have on your land that are going to be able to build a home? So, if someone just comes along and cuts it and you've been waiting for this tree to get to a certain size before you used it you know ...
IDI-MR-H-08	Someone stole your house.
IDI-FK-H-01	Exactly! So, it's a big deal. You don't cut ... you don't go and help yourself to someone else's section.
IDI-MM-H-14	*Pitpit* and all those things they're not owned by anyone. They're not demanding. No one owns them. It's natural land. Anybody can go and cut any *pitpit* anywhere. It's like the rainforest. The rainforest is everybody's. So, anybody who wants to go and build a house they can go and cut timber in the rainforest and it's for everybody.
IDI-MV-H-04	In traditional days men went to the bush and selected tough rope … It's like lawyer cane but it's smaller … they know which types to select which will last for fifteen to twenty years. And strong timber … then they made houses.
IDI-MM-H-14	But for ropes, I think nails are taking over. Nails are taking over from vines. It's costing three dollars for a packet of nails. There's about fifteen or so in it.

It is evident from the above conversation that an understanding of the social norms, as well as an awareness of the amount of personal contribution that goes into building a house, is a vitally important aspect of harmonious community living.

Understanding the boundaries, both social and physical is nonetheless subject to the dynamic construct of maintaining traditional ways in contemporary times, as expressed during an interview with Councillor Peter Raim.

> *'[for the younger generation to understand about the round house] we teach them. It is each and everyone's responsibility like the family… as a leader to just let them know that our forefathers were like this, they built round houses like this, they made a big thing like the pig killing, all the decision making … we normally teach them to make sure that all our traditions are not forgotten. Someone has to maintain them. Because when we compare them with the modern system, most of them are really suitable to our way of living here … combining both' (Raim 2016, personal communication, September 30).*

5.2.3 Gatek Built Environment

Adjacent to Kunguma are the Kopi tribal lands and the village of Gatek. The Kopi have a close association with the people of Kunguma, as both neighbours and allies, although each village is independent. Each has its own Councillor, but often combine forces in matters of importance (such as roads, schooling, and the like) that affect those in the regional precinct. Somewhat further off the road than Kunguma, Gatek Village nevertheless has a similar built environment. Villagers from Gatek and Knep joined those from Kunguma for the *Haus Man* construction and provided additional data for this research[62].

The Penambi and Kopi tribes living in the Kuta Range south of Mount Hagen belong to the Temboka and Melpa language groups. Physical boundaries are loosely defined, due to the permeability and blurring of boundaries between land belonging to each of the groups. There

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[62] Strathern (1971: 19) talks about the role of tribes that are linked as a pair-tribe, with the linkage sometimes, but not always, supported by an origin myth associating the first ancestors of the two tribes. Sometimes a tribe may migrate to a new area and will need to develop another with one of its new neighbours. Strathern suggests that small tribes are likely to have strong pairings, possibly because they contributed to survival in the past. This confirms similar findings by Read (1954: 12) who describes inter-tribal paired relationships which '*are linked to one another by a complex network of ties and cleavages.*'

Wilson (2019: 19) cites Strauss (1990: 11) with regard to the concept of a tribe-pair: '*In my opinion this is not a principle – not even a "male and female" principle – but a vital experience of the need for complementation, of the way in which all things, living and dead, require something else, a complement of fulfilment, without which the individual being is "out of its place" or "out of line" is removed from the center of things and unfulfilled*.'

have been moves to survey Kopi boundaries and register the area to ensure future land security, but the uptake of this Government initiative to make customary land more accessible has not been consistent across the country. Registration was meant to allow for voluntary incorporation of landowning clans, the registration of their land, and the leasing of this land for up to 99 years, to make land held by customary groups available for individual enterprise (Chand 2017).

The Penambi decided against registering their clan lands but offered no reasons for this choice. Having spent many years researching in PNG, albeit predominantly in the Sepik area, Telban (2018a) in personal communication with the author (email 11 January 2018) states that feelings and observation rather than questions are more important, and that it is necessary to find the right people to learn stories from. The decision regarding land registration was not openly discussed and therefore not pursued by questioning. It was made clear however that the registration of customary land is a potential area of conflict when physical borders are indistinct, and when, furthermore, doubt exists about whether landowner registration empowers customary control and management of land or removes that control.

Interestingly Strathern (1971: 85) provides an example from the Nebilyer Valley, recounted by older informants of Elti-Penambe in 1965, when Penambi and Kopi tribes were enemies. Mokei and Kope (Kopi) along with other surrounding groups launched a massive attack on the Elti-Penambe tribe-pair who were driven from the Nebilyer Valley by this powerful coalition of enemies. For the Elti the major enemies were sections of the Mokei tribe while for the Penambi the Kopi were enemies.

In the contemporary context of this research, Penambi and Kopi are allies and neighbours who intermarry, participate in exchange ceremonies, and share the community school at Kuta. Councillors from both communities participated in the construction of the *Haus Man* and mentoring of students for the JCU field school. Nonetheless, memories of conflict remain in the consciousness of those involved, contributing to a reluctance to discuss land registration or the potential conflict over borders.

5.2.4 Field Observations: Kunguma

In the introduction to this chapter it was noted that the symbolic importance of certain buildings, while no longer connected to traditional ceremonies in their context prior to the arrival of Christian missionaries, is nonetheless interwoven with the concept of continuity and identity constructed through architecture. The underlying sentiment attached to the *Haus Man* is related

to its significance as a means of maintaining connections to the land for the next generation, and thus the potency of identity within the Penambi social fabric.

Because this research project was pre-arranged with key informants, the site was selected, and the main materials gathered, before fieldwork began. The forests on clan land belong to all in the clan but there are tacit and complex protocols for selecting and harvesting trees and the various vines, mosses, ferns and bark that are also used.

Shown in *Figure 5.11* is an unnamed variety of vine for binding (possibly a variety of hoya) on the left, sphagnum moss for plugging any gaps in walls, covering floors and the like (centre) and a young primary school-aged boy carrying part of a tree trunk (right) to the building site, a distance of more than five kilometres, to be sized and shaped for the main structural posts of the round house. One medium sized *kuang* tree (species unable to be identified by this author) can usually produce 40 to 50 posts, which is sufficient for an average sized house. It is obtained from the rainforest on clan lands, cut with a small axe by one to two men and carried to the building site to be stacked for further shaping and sizing.

Figure 5.11. Building materials obtained from the forest.
Source: By author. Unidentified vine species, left, sphagnum moss, centre, and unprocessed timber being carried from the forest, right.

An initial series of conversational interviews with mentors was broad in scope and designed to establish, as quickly as possible, the framework for more detailed enquiries. Knowledgeable informants (in this case older mentors leading the construction of the *haus man*) were asked about aspects of building material procurement, concentrating on several avenues of enquiry, namely: from where the material was obtained, who was involved in the decision making about material procurement, how many men and/or women worked together on preparations and gathering of materials. As a result of these initial discussions the author was

able to establish a comfortable rapport and provided with opportunities for guided walks through the rainforest to see the variety of materials available, learn their *tok ples* names and their uses.

As noted in the previous chapter, five male descendants from a singular family *lain*, could form a new *haus* to hold the land. Historical connection to the land on which the *Haus Man* was to be constructed was through Maggie Wilson (see genealogy Appendix C). The previous house on the site belonged to Maggie's daughter and was accidentally burnt down. Because she was living in the UK at the time of the accident and had three sons, her family did not want her to feel she had lost her home and decided to build a house so that her sons would know their home is still in the village. A collective community decision was made that the new building needed to be a *Haus Man*, and that documenting the construction could be used to inform this research. Although it is merely speculative, the formation of a new sub-clan was important in terms of continuity. After the previously mentioned tribal war (circa 1920s) few survived, with one male later returning to Kunguma to re-establish the patrilineal line. Maggie was a direct descendent of that line.

Table 5.6
Interview: Haus Man Symbolism

Respondent	Transcript
IDI-FK-H-01	(Translating) So ... what we're doing is we're building a traditional *Haus Man*, or it's a meeting house for men. There are two different kinds but the one we're going to do is a round one. And he (IDI-MK-H-01) said traditionally normally when they put the posts in first and then put a big pole in the middle to hold the rafters in place, and when they did that they would kill a pig to mark the occasion and the blood from the pig kill they would rub it on that post and I guess it was symbolic of the fact that that was going to be their meeting place, so that's the kind of house we are going to build in the next 10 days.
IDI-MV-H-01	*Kopi gat one pla haus man, no ol gugu Marandi*? So, sub clans? So, one tribe *wan pla haus,* one tribe*, wan pla sub-clan, one pla haus*. (Explaining) each clan has a men's house but within that group, a sub-clan also has its own men's house.
IDI-MV-H-04	Built for gatherings, plannings, decisions for leaders, decision for whole tribe, they get together to make decisions of how to run the community, when there is a gathering of feasts, compensation, special decisions are made especially, in the round house. But for the whole community, like the councillor and me we can select a certain place for the whole tribe; like now we're building a round house where all community leaders come together to make decisions. We all community decide.

Several researchers have noted that, in one form or another, men's houses are found throughout PNG, in a variety of forms and levels of significance (Williams 1924; Williams 1937; Williams 1940; Hogbin 1951; Read 1954; Bateson 1958; Reay 2014; Hauser-Schaublin 2015; Sillitoe 2017b). Regardless of whether it is an elaborately built or decorated structure, it has

generally been described as an important centre of ritual life. Consequently, the opportunity to be able to document the construction of the *Haus Man* at Kunguma, and to ask questions of the builders involved, was a privilege.

Following is a photographic record of the construction process observed during the 2016 field trip, followed by photographs of the 2017 field trip during which the pit toilet was constructed. All images are by author, unless noted otherwise.

5.2.5 Haus Man Construction 2016

Figure 5.12. Clearing the site.

'*There must be a creek nearby for water, while the land area around must have good fertile soil for food crops*' (IDI-MM-H-04). The ground is cleared of vegetation. For this site, an old vegetable garden was chosen, however it is not unusual to clear virgin forest or regrowth scrub if it doesn't belong to anyone else. Clearing and levelling for this site took about half a day.

Figure 5.13. Levelling the site.

The ground is dug over, cleaned of any root material and then compacted by several people stamping and jumping on it and pounding it with spades. A deep drainage ditch is dug around the perimeter of the site to prevent water ingress that can result from the high annual rainfall the area experiences. Western Highlands has significant rainfall of approximately 2600mm annually.

Figure 5.14. Setting out.

Setting out the building is done by measuring the approximate length desired in human footsteps. The traditional numbering system said to be used by the Penambi Wia was based on sets of eight. Once consensus is reached, a rope or vine is tied around a stick and the outline drawn on the ground for positioning the posts. Councillor John Kawa and Nori Kupal mark the boundary.

Figure 5.15. Splitting logs for posts.

Logs are usually obtained from the forest. Trees are cut down with an axe and dragged to the site by two or more men, depending on the size of the tree. Once on site the logs are split and sized. *Kuang* is the species of timber most often used nowadays, being extremely hard and durable. It is the second most important timber. *Kwila* is preferred but, according to informants, most of the big trees were taken by the ATA timber mill for housing in town (Mt Hagen).

Timber uprights, *punga,* for the main wall of a traditional round house are shaped and sized with a machete by Steven Kuipa. Hard and durable, it is said to last between 15 and 20 years, making it an ideal structural timber. Often the posts are re-used and relocated if the house falls into disrepair.

Figure 5.16. Shaping posts.

When enough posts are ready, both men and women carry the posts to the building site. As the people use their houses primarily at night for sleeping, protection from the cold night temperatures is important. Most houses are built on or close to the ground to prevent sub-floor ventilation and a circular floor plan allows the most compact house form.

Figure 5.17. Transportation.

Posts are driven into the ground manually along the set-out line, progressively lifted and dropped until an estimated ideal height of a man is reached. The posts are buried deep into the ground (about one metre) providing some resistance to lateral loads. The first posts to be placed are those for the doorway, positioned to be able to observe people approaching but also away from the proposed location of the toilet.

Figure 5.18. Pile driving.

Wall lining for the Haus Man was woven from a type of cane grass called *kumei* or *pitpit* Miscanthus *floridulus*; it is a different species to the edible pitpit, Setaria *palmifolia*. Native to Papua New Guinea, *kumei* is commonly found along riverbanks forming dense stands. Cut and bundled into a size that men can easily carry, it is dried in the sun for two or three days. The nodes of the cane are then split over a stone.

Figure 5.19. Splitting *pitpit.*

Figure 5.20. Flattening *pitpit*.

Thomas Las demonstrates the way to flatten the canes in preparation for weaving. They are drawn through a forked stick and piled up for the weaver (who has generally already pegged out the required length and width).

Figure 5.21. Weaving the blind

The average blind is about 1.8m wide and 35m long. Although described as traditional, older mentors constructing the *Haus Man* described the woven walls as adapted from small projects their children were taught at mission school about 50 years previously. Kuipa Tugl, seen weaving here, says that it takes about three days to make each blind.

Figure 5.22. Pandanus species.

Prior to pipit woven walls, the buildings in this area were thought to be clad with bark from a type of tall pandanus, or planks of split timber (Loupis 1984; Golson 2017).

For a small house about four rolls of blind are needed (two for internal lining and two for external cladding). The cost, if one needed to be bought, is approximately 100 kina per roll (2016 price).

Figure 5.23. Ready for cladding.

A continuous ring beam of young, more slender trees at the top of the posts, acts in a similar manner to a tension ring, distributing the vertical loads from the rafters on to the wall, which is strengthened and reinforced by the wall cladding membrane.

The internal blind is nailed to the posts. The walls are built in layers. There are usually no windows in a Haus Man. Some say this was originally because of fears about sorcery, but in the context of this research the lack of windows was related to demonstrating a traditional house.

Figure 5.24. Internal lining.

A layer of plastic is wrapped around the exterior of the internal lining for both waterproofing and to keep out any cold night winds, after which the external cladding is wrapped. Prior to plastic, bark lining was used. Nevertheless, despite the cost, plastic is considered more practical in the damp environment, and easier to work with.

Figure 5.25. Waterproofing.

The centre post is shaped and prepared. Hewed from *kuang*, it is about 200-280mm in diameter.

Figure 5.26. Centre post.

The centre post is placed. Measurements are double checked against the length of a rafter to ensure it is correctly positioned and aligned. Although seemingly haphazard, there is always a senior, more experienced guide who oversees the construction process, quietly calling out instructions and offering advice.

Figure 5.27. Aligning centre post.

Figure 5.28. External cladding.

With the external cladding in place, the waterproof barrier is turned up and the soil mounded at the base to prevent the ingress of water and vermin. Horizontal battens of split wild pandanus *(takum)* are fixed on the outside of the blind, at the top, middle and bottom.

Figure 5.29. Rafter connection.

The upper rim of the blind is folded over the ring beam prior to fixing the rafters. Note the sturdy post for the door frame. Any gaps are tightly packed with sphagnum moss collected from the forest.

Figure 5.30. Roof battens.

The rafters (*koki)* are approximately 50mm diameter saplings or branches spaced at an average of 300mm centres, spanning between the wall and centre post. Battens are cut from a flexible forest vine *(tambiga)* and nailed and tied with thinner vines (w*ieng)* in a concentric circular pattern over the rafters.

Figure 5.31. Roof framing.

The battens are spaced at approximately 250mm centres, to accommodate the distance required for thatching.

A field sketch of the construction components of the *Haus Man* with *Tok Ples* names indicated where they were elicited on site is shown in *Figure 5.32*. The period of construction was seven days, not including felling the timber and transporting it from the rainforest to the site. Despite slight delays due to intermittent rain and time off for an unexpected funeral at a village some distance away, as well as slowing construction to allow students to participate, a week to ten days is considered adequate time to complete a structure such as this one.

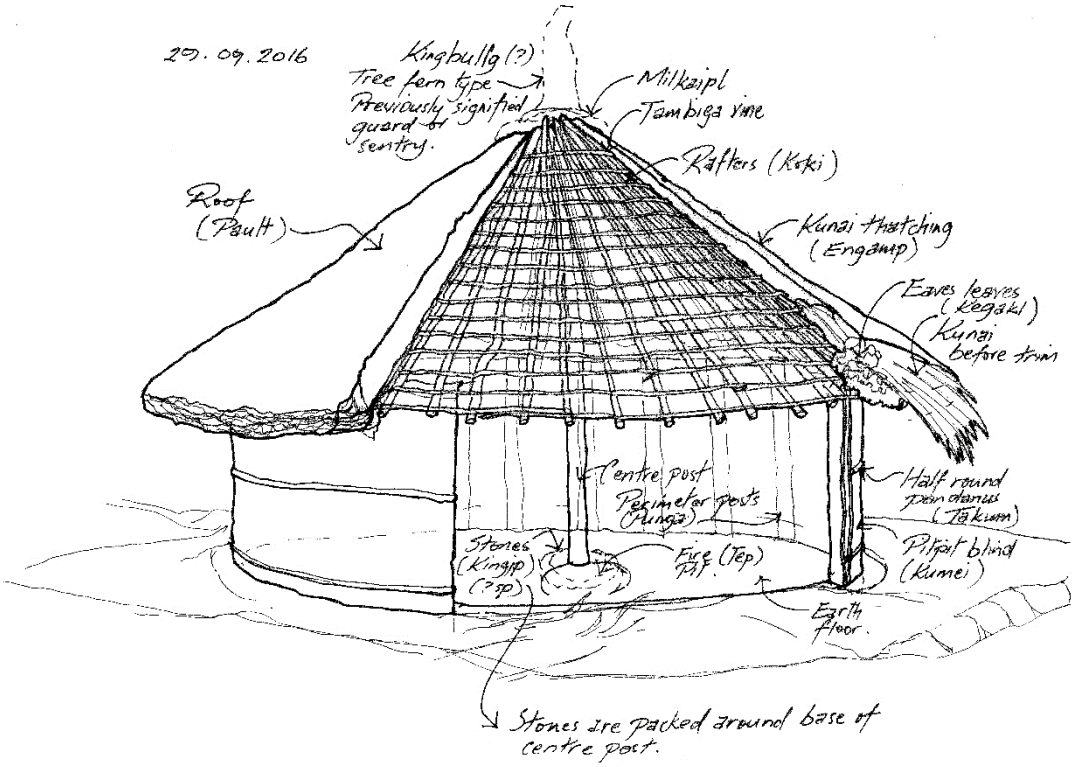

Figure 5.32. Field sketch. Cross section of Haus Man 2016.
Note: Tok Ples names are spelled as they sounded to the author (by author).

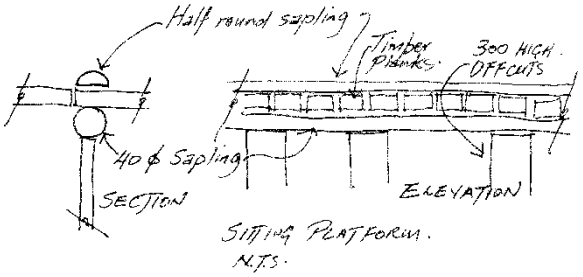

Figure 5.33. Field sketch of sitting platform.
The platform at Kuipa's house was in the sleeping alcoves and extended into the sitting area around the fire at about 850mm wide (by author).

Once the roof framing is ready the men and women trek to a *kunai* field where the grass is deemed long enough to cut for thatching, an arduous but shared task (*Figure 5.34*).

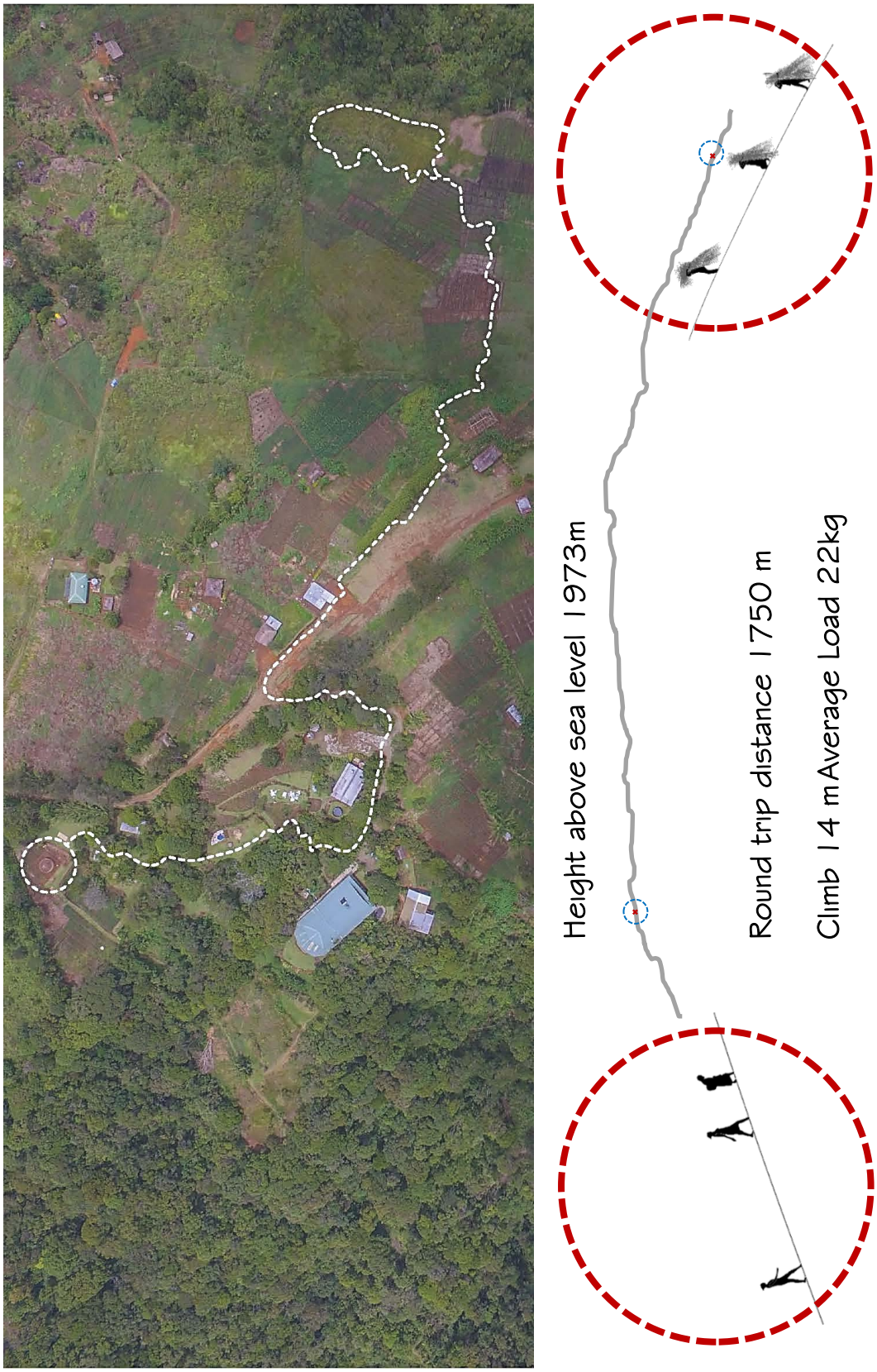

Figure 5.34. Journey to the *Kunai* Fields (by author).

Men and women work together to obtain *kunai* grass *(ungamp)* for thatching. When a suitable stand of *kunai* has been agreed upon, men cut the grass while the women bundle it. Once a sufficient quantity has been cut and stacked, it is carried back to the building site. The men prefer it if the grass is bundled while they are cutting it but not carried away until a good quantity has been cut.

Figure 5.35. Cutting *Kunai.*

'They like to get it all cut up and then get the ladies to go and carry it because they say that it makes them ... it makes their hands tired … it's the momentum. Because when you're cutting it you like to see it build up. But if you're cutting it and people are taking it away, then you just feel exhausted or defeated, because you're still having to keep going … so, you wait until it builds up' IDI-FK-H-01.

Figure 5.36. Carrying *Kunai.*

An average load is surprisingly heavy considering the distance the bundles are carried and the adverse terrain conditions. While Kunguma ladies carried between 22 and 30 kilos each per load at a twenty-minute brisk walk, the average for JCU researchers was between 7 and 12 kilos.

Figure 5.37. Logistics.

Preparing a feast for all those who helped. Little money changes hands. Most buildings are constructed with assistance from close kin who work within a system of gift exchange and obligation *(moka)*. Nevertheless, providing food for researchers and other visitors brings welcome money to the village as well.

Figure 5.38. Labour costs and reciprocity.

Figure 5.39. Fascia material.

Large fern leaves (*kirlkalch)* are tied to the second row of battens with thin vine by Monal Pup and draped over the end batten to form a fascia hanging down from the projecting eaves. This helps keep the bottom thatching up and protects the ends of the rafters, while preventing rainwater penetrating the walls. The fern leaves are bundled together four at a time, to leave no gaps.

Figure 5.40. Preparing thatch.

Kunai grass is tied into smaller bundles suitable for binding to the rafters.

Figure 5.41. Thatching.

Tight bundles of thatch are tied with vine (w*ieng)* to every alternate row of battens.

Figure 5.42. Thatching the roof.

Thatching is continuously overlaid, with the root ends facing upwards, until two rows of battens from the top.

The original set-out of the Haus Man was enlarged as there were extra posts. Hence, a walk to the forest by Nori Kupal to gather more fascia material once thatching was underway; a two-hour round trip.

Figure 5.43. Variations.

The aesthetic qualities of the traditional roof are emphasised as the roof thatching nears completion. The rafters transmit the roof loads (battens and thatch, along with the live loads during construction), to the centre post and walls, as also noted by Loupis (1984: 6).

Figure 5.44. Closing the gap.

The top thatching is built up like apex capping with five or six big bundles of kunai spread evenly around the crown. The direction of thatching is reversed at two rows of battens from the top so that the roots of the thatch are now facing downwards.

Figure 5.45. Ridge capping.

With thatching pressed towards the centre of the ridge, a ring woven from vines and *kunai* is pressed around the top by Nori Kupal and Thomas Nori, as a "neck-tie" *(milkaipl)* to fix everything securely together.

Figure 5.46. Woven ring.

Figure 5.47. Finial.

A large tree fern stump is finally fixed to the apex *(kingbulg)* with strong vines. The traditional builders said the projections were formerly a protective symbol to deter enemy attack but are now purely decorative. Similarly *Grey (1979: 6)* noted this at Chuave '*These projections were formerly symbolic watchmen, who guarded the house against enemy attack at night. […] The projections are now seen only as decoration.*'

Figure 5.48. Final trim.

The *kunai* thatching is cut at a bevel with scissors to give a neat appearance.

Figure 5.49. Fireplace.

Once the enclosure is complete a smoking ceremony takes place. A new firepit is built using ash from an existing house (described as symbolic of generational continuity) that is mixed to a slurry and shaped into a circular bund. When the slurry has cured, a fire is lit, and the smoke drifts up through the thatch. Over several years, an accumulation of black tar-like residue seals the roof.

Figure 5.50. Completion.

Round houses traditionally have only one doorway, closed by horizontally stacked wooden planks, the bottom one or two left in place as a raised threshold. In recent times many houses have store-bought, hinged doors. Sitting and/or sleeping platforms raised about 300-450mm above the ground are built according to personal choice. The location of the door is sited first; it must afford privacy while also enabling the residents to see any approaching visitors. It must not face the direction of the intended location of the pit toilet.

5.2.6 Pit Toilet Construction 2017

For toilet facilities a pit is dug about one metre square and covered with closely spaced logs. The first pit dug in 2017 kept filling with water so another was dug higher up the hill above the water table. It is common practice to have the pit some distance from the house.

Figure 5.51. Digging the pit.

The logs are covered with cane grass to fill the gaps and a small hole is shaped in the log platform. Ash is poured into the pit to prevent any odour and added to when necessary throughout its lifecycle.

Figure 5.52. Covering the pit.

Posts are positioned in two rows to establish the sides of the building. Most outhouses are constructed in a perfunctory manner and are easily replaced when a new pit is required.

Figure 5.53. Pit wall posts.

Roof beams are fitted.

Figure 5.54. Placing the roof beam.

Figure 5.55. Wall cladding for WC.

The wall material for outhouses is generally whatever is easily at hand, as the building functions merely as a privacy screen, usually with no door or other means of closure.

Figure 5.56. WC pit.

The logs and grass padding over the pit are covered with a layer of approximately 100mm of compacted clay.

Figure 5.57. Sphagnum moss.

The pit floor is then thickly covered with sphagnum moss collected from the forest nearby and replaced from time to time. Kept moist by the damp weather, the moss provides a soft carpet underfoot.

Figure 5.58. WC Roof.

The roof is completed with bamboo or sapling rafters and covered with cane grass bundles lashed with vines or bark strips.

5.2.7 Gatek Village Housing 2017

Figure 5.59. Kopi land.

Steep terrain and lack of roads and infrastructure make access to Gatek Village physically challenging.

Figure 5.60. River crossing.

The final ascent is preceded by a precarious double-log foot bridge, deftly crossed by residents accustomed to such conditions. It is an improvement on 2016 when the bridge consisted of a single log. The drop to the boulder-strewn river is about three metres.

Figure 5.61. *Haus Kuk*.

Haus Kuk with extended gable end, one of three kitchen buildings in the family compound. The metal roof below is the pig house.

Figure 5.62. Transition.

A more modern house with windows and plank door. Traditionally there were no windows in the houses and only a small opening for a door, which required an adult to crouch down in order to pass through.

Modern *(kapa)* metal cladding, concrete slab, windows and internal partitions.

Figure 5.63. Modern.

Cooking is, in most instances, by wood fire. Water is carried from a nearby creek or spring for cooking. In the case of this house cluster, the owner has established a system of bamboo pipes from a small waterfall beside the compound from which water can easily be fetched. He has also dammed a small pool in the river below where '*the mothers can sit and do laundry and wash themselves'* IDI_MM_H_04.

Figure 5.64. Cooking facilities.

Cassowaries are kept as a form of wealth and prestige, usually reserved for gifts at special ceremonies such as bride price one of which the author was privileged to attend at the adjoining Knep Village in 2017.

Figure 5.65. Cassowary house.

Homes close to the main road (shown here) have access to mains power, however many have no power, while others have installed solar panels. Analysis of the data (*Figure 7.5*) shows a connection between the use of power and educational levels.

Figure 5.66. Power.

5.2.8 Kunguma Village Architecture and Settlement Patterns

When showing the relationship between the built structure and village settlement patterns, no photographic records could be located for Kunguma itself. Some early aerial photographs taken in other unidentified villages in the Highlands circa 1933 gives an indication of the organic nature of settlements as either clustered or spread out in linear fashion, depending on the site, surrounded by gardens. At that time, all the houses were traditional (*Figure 5.67*).

Figure 5.67. Highland Village Settlement Patterns 1933 (cropped).
Source: Bernatzik (1933) with permission from Photoinstitut Bonartes, Vienna.

Similarly, Cook and Cook (1961-1963a) showed a variety of settlement patterns and house forms during fieldwork at Kwiop, WHP in the early 1960s as shown in *Figure 5.68*. Despite the passing of thirty years since the Bernatzik images, there does not appear to have been much of a difference in the pattern of settlements in this region.

Figure 5.68. Highland Village Settlement Patterns 1961-1963 (cropped).
Source: Cook and Cook (1961-1963a). Courtesy of UC San Diego. Edwin Cook Papers. MSS 0187

In recent times, many rural villages such as Kunguma are still constructed using traditional materials and maintain a largely organic settlement pattern that allows for access to gardens suitable for a subsistence lifestyle.

Homes at Kunguma need to meet a wide range of social constructs. Moreover, reliance on traditional family ties and exchange systems is still strong, as is a commitment to self-reliance and nurturing. To a large extent, social commitments dictate how things are done within the predominantly informal economy which underpins the social structure of village life.

Table 5.7
Interview: Kunguma Social Economy

Respondent	Transcript
IDI-FM-H-02	Men spend [their money] on like compensation or bride price or funerals and *haus krai* and anything like that … building, school fees. Women spend their money buying food or clothes for kids and support family for gardening and buying seedlings.
Author	So, in most villages would there be someone who knows more about building that would lead, or just everyone knows?
IDI-MM-H-14	You're right, you're right there would be somebody who would be doing a lot of talking even though he's not doing any work, he would at least be talking and giving advice and saying ... you know ... this should go first ... you know ... take that out ... that sort of thing you know. It's something that individual person is given as a gift ... I think. It comes to him naturally so that when everybody else is quiet he's doing the talking and all that you know.
Author	Would he have learnt from his father or is it just something that … for example some families re better at building than others?
IDI-MM-H-14	It's something that individual person is given as a gift, I think. It comes to him naturally so that when everyone else is quiet he's doing the talking. That person is a good builder, he's a hard worker and maybe, because he's getting older, he's doing the talking to give the young people his knowledge.
IDI-FR-H-02	Must be a lot of ... the directions like ... the changes that are happening; all the big changes that are happening now. From the old to the new ... how would they be coming together?
IDI-MM-H-14	Kids don't see the changes you see. I mean ... even they do; they don't see it as much as I do. Kids think that it's a normal thing, you know. They grow up, they go to school and think that people have gone through the same life ...
IDI-MM-H-14	I'm growing peanuts to sell … my daughter ... she's helping to dig and sell. We're trying to get her to get to school next year ... yeah and I'm trying to pay school fees and we know it's about five grand. But I don't know how we going to raise that money ... we got peanuts ... yeah. (Laughter all round at the joke).

Although housing draws the community together, change is accepted as inevitable. One aspect mentioned several times was the importance of education in the face of change. Hence in terms of social economy, men are responsible not only for big ticket items like bride price, and funerals, but also school fees, while women provide for the day to day living expenses.

Although responsibility for building a house largely falls to the men, women assist with collection of kunai, providing sustenance and other tasks, as well as contributing to the cash required for nails and so on, through growing extra produce to sell. This cooperative approach to collective building effort provides an efficient construction and mutual support system. It is clear, that deep admiration exists for those with the skill to guide others, not in a boastful way

but as a way of sharing the gift of knowledge. The choice to remain living in the village is important also for continuity, or family concern for the elderly and those who cannot take care of themselves.

Table 5.8
Interview: Kunguma Family Group Housing

Respondent	Transcript
IDI-FK-H-02	What happens to old people … when they get old?
IDI-MM-H-14	Even they are old they get a lot ... somebody to look after them or you know. They still want to do their own thing. They're very independent. They're still cleaning the gardens or doing something. They don't sleep and rest. ... older people still want to move around, still want to go to their gardens, still want to do what they did, you know ... when they were young, so to get them into a place where others will look after them that is really new to them. They wouldn't agree with that. No. Go to an old people's home and be looked after by strangers.
IDI-FK-H-02	So you're still a young man (55 approximately) but what do you think in your old age ... what would you ... as you get older, say you become a bit frail and you know, it's hard for you to work for yourself what would you like, what's your dream?
IDI-MM-H-14	I'd prefer my daughters to look after me. You know ... I'm thinking that my daughters will look after me. In fact, they've already started, so you know ... In the old ... in the past during my parent's times, people were really friendly ... they were more sharing and caring type of people, you know that was the type of system that we used, I think my parents used. They're always really helpful, they're always caring they always ... you know ... they didn't want anything to go wrong. And they were caring for each other. So, I think in the old days people were really caring and sharing. After they level it up, [the ground] they got to measure how big how the rooms are going to go, how the kitchen will be ... the bedroom ... it's normally the kitchen and the bedroom the house. Bedroom, kitchen and living in the same area. And everybody cooks in the same room. They line up and you know ... just one room. But that's not happening now you know. Now everyone is getting their own rooms and all that, so times are changing.
Author	Which one do you prefer?
IDI-MM-H-14	I prefer better on my own yeah (laughs).

It is evident from the data that choice is important, and that choice in terms of living arrangements has always been part of traditional ways.

Thus, despite the concept of families living together being a common cultural constraint, the reasons for doing so (such as safety and mutual support) are no longer as important. Therefore, although older family members still expect to be looked after by their children and, in exchange, work for their place within the community, they do not necessarily want to share the same house.

Moreover, people who have inter-married may favour a way of life similar to their village of origin, including the emplacement of their housing within the village. For example, one wife from the Southern Highlands (SHP) has a fenced compound which is unusual in Kunguma, but common in some Southern Highlands villages (*Figure 5.69*).

Figure 5.69. Fenced and gated house cluster at Kunguma 2016.
Source: By author.

During the 2016 and 2017 field trips to Kunguma, the author's main mentor and village stay host was Kuipa Tugl. After his first wife was killed in a gold mine collapse, Kuipa (about 60 years old at the time of writing) remarried, living independently with his wife from a different village, with other family members living nearby.

Interestingly, although traditionally the preference is for strategic marriage alliances, in the contemporary context there are other methods of finding a wife. Thus, Kuipa and his wife met through phone dating. The process, as explained to the author, is the random selection of a phone number and cold calling to see if the person who answers is looking for a partner. If so, they agree to meet. It is under these circumstances that Kuipa met his second wife. A field sketch of Kuipa Tugl's living complex is shown in *Figure 5.70*.

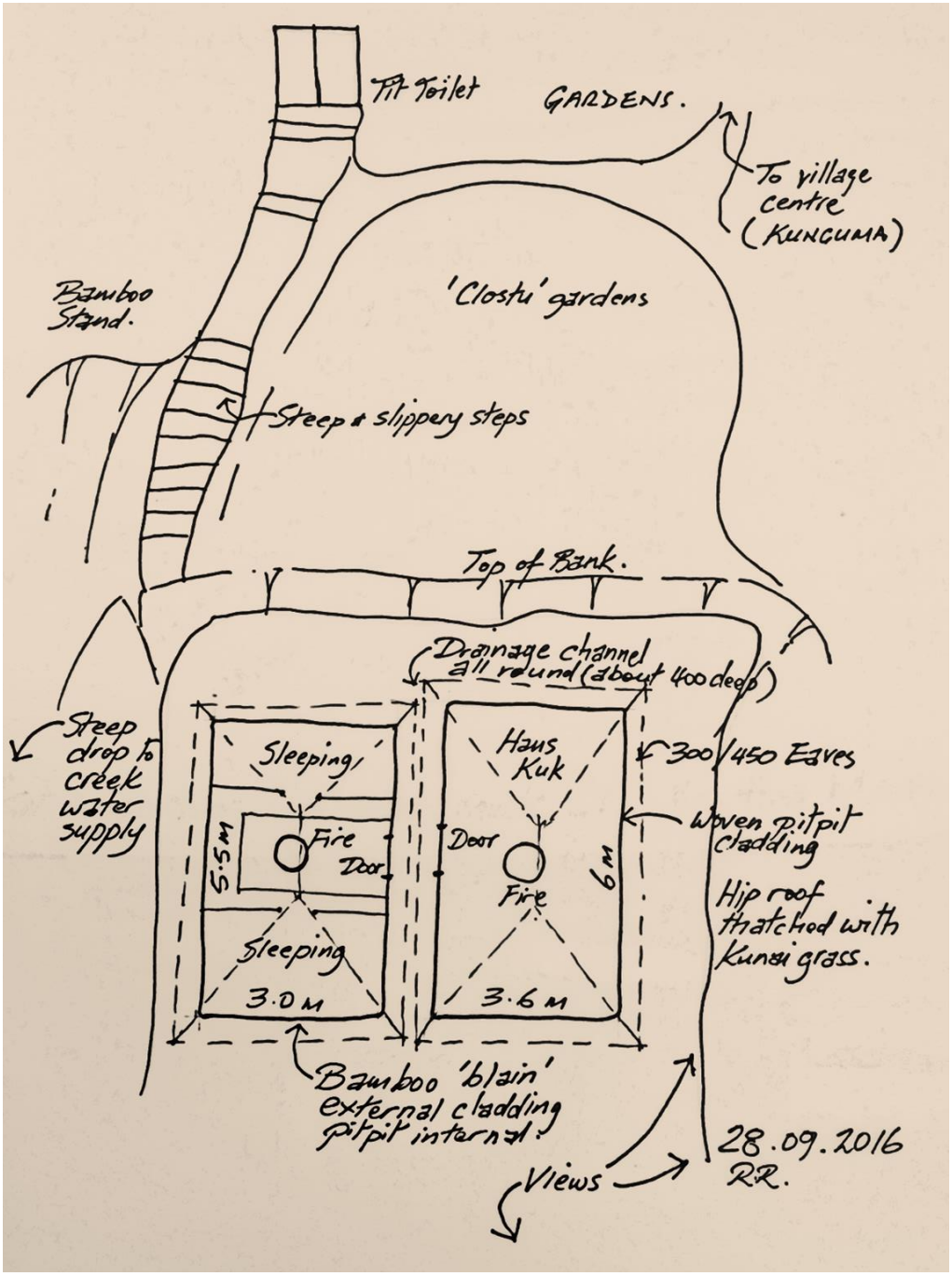

Figure 5.70. Field Sketch of Kuipa's Place: village-stay complex, Kunguma (by author).

Gardens for everyday use are close to the house (*clostu gardens)* as is the norm, with other gardens further away for growing saleable produce to supplement the family income. The layout is typical for the village; one building for cooking and eating (*Haus Kuk*), a separate building for sleeping, and a pit toilet close by but with a private aspect. In this example, all but the firepit area of the sleeping house has a raised platform about 450mm above the ground.

This house is an earlier rectangular type, constructed in a similar manner to the *Haus Man* with an inside wall lining of woven *pitpit*, a plastic waterproofing mid-layer and an outside layer of woven, split-bamboo cladding. As can be seen in *Figure 5.70* and *Figure 5.74*, *kunai* thatching has been used for the roofing. There are no window openings and only a single door opening for each building, as is common with earlier type housing. As Loupis (1984: 4) noted, basic post and beam structural systems offer unlimited possibilities for improvisation.

The inclusion of a raised sleeping platform is an individual choice, as is the decision to have two separate bedrooms. Originally, what is now the *Haus Kuk,* was the only residence, with the main sleeping house a later addition. Although there are generally only two occupants in this example, the extra bedroom allows for other family members to stay. Despite the cold evenings, talking and sleeping inside proved cosy and comfortable.

Figure 5.71. Village-stay Complex 2016.
Haus Kuk on the left when viewed from *clostu* gardens on the bank above. Smoke rises through the thatch in the cold, misty morning (by author).

Figure 5.72. Steps to pit toilet.
Steps are not usually necessary. These were built by Kuipa out of concern for the author's inability to climb the slippery slope with a broken hand (by author).

Figure 5.73. Steep drop to the creek beyond the bamboo.
This is the main source of water for cooking and washing. If people get thirsty, they will pick and eat a type of cucumber (resembling a crystal apple cucumber) from the garden (by author).

Figure 5.74. Roof framing inside Kuipa's house.
Roof framing and thatching is blackened from several years of wood smoke. The soot helps protect the thatch and improves the longevity (by author).

Evidence from this research in Kunguma shows that the transition to modernisation has been slow in rural areas when compared to towns and cities. Housing in transition is a means of social mobility however, because access to customary land is relatively secure. Self-help, staged housing using largely bush sourced materials and collective action is still the norm. nevertheless, the younger generation have been away to the cities for schooling and consequently, when they return, they want what they have been exposed to and grown accustomed to while away.

Despite the acknowledgement that *kapa* houses are too hot and uncomfortable during the day, and too cold at night, they are considered longer lasting against the elements, and are associated with cleanliness, especially if placed on a concrete slab or raised on stumps. Being elevated on stumps also has a level of status attached. As one respondent said '*But in the future, I think I might have visitors for example like you and your students […] that's what I'm planning for the house. I need to have a septic in the house and probably a shower – everything – a sink and dishes and more like kitchen […] Something different. Me, as a leader, I would like to live off the ground. First house off the ground you know!*'

5.3 CASE STUDY 2: TUBUSEREIA VILLAGE CENTRAL PROVINCE

> *In two hours, we reached Tupuselei, a Papuan Venice, built in the sea, on piles, and entirely isolated from the land, communication with which is carried on by canoes. The inhabitants own productive plantations on the slopes of the mainland, raising yams, bananas and other 'native' food in abundance; they are also expert fishermen, and being well to do, and on friendly terms with the hill tribes, live happy lives after their fashion. To behold a community like this living in a village consisting of rickety huts six feet above the water, and half a mile from shore, excites wonder and astonishment, not the least difficult problem to solve being how the builders managed with the slender means at their disposal to drive the piles supporting the houses into the sea (Lindt 1887).*

Tubusereia is about 17 kilometres southeast of Port Moresby on Bootless Bay in a direct line, however a road journey is about 80 kilometres. The Magi Highway from Port Moresby is sealed as far as the turnoff to Tubusereia, after which it is unsealed and subject to flooding during the rainy season. It is a common occurrence for vehicles to be bogged at these times.

There is a regular PMV service linking Tubusereia to Port Moresby, and the village is blessed with a primary school that was established in 1969. Centrally located, the school caters for students from Grades 3 to 8. A separate elementary school caters for Prep to Grade 2.

One of numerous coastal villages originally built over the sea, Tubusereia numbers about 600 households (National Statistical Office Papua New Guinea 2017b).

Like many of the PNG coastal villages, Tubusereia is spread out over a large area with houses dotted seemingly randomly across the landscape and out into the sea. Built on tall piles driven into the sea bed, these stilt homes are reminiscent of the original village houses first encountered by Europeans. Peterkin (2019) noted in 1961 that Tubusereia was almost entirely out over the water with only a few houses and the village church on the foreshore.

In contrast, Oram (1967) reported that by 1966 there were no traditional houses left at Hula, further along the coast to the south-east, and that half the village was land based. The trajectory has continued for Hula and several other coastal villages so that very few, if any, houses are now built over the sea in those areas, making Tubusereia one of the few remaining examples. Drone photos of the main area of the village in 2016, are shown in *Figure 5.75*. The house on the small hill where the author stayed during field studies is the same hill referenced by Manning (1905) and Gammage (1976) in *Figure 5.94* and *Figure 5.95* respectively.

Figure 5.75. Study Area: Tubusereia 2016-2017.
Source: By author. (Drone pilot Bernard Bouraga). Village stay was in the house on the small hill.

5.3.1 Tubusereia Built Environment

Typical traditional buildings for coastal villages were rectangular stilt houses with front verandah and gabled roof. This remains the dominant form regardless of whether over the sea, or on land, although materiality has changed. As seen in the video clips from Peterkin (2019), the small hill had not been built on at that time (*Figure 5.76*). Survey information from the owner confirms that the house on the small hill, where the author stayed during the village stay, was built in about 1973. The images also show a combination of traditional and corrugated roofing, which accords with information provided during interviews with respondents at Tubusereia.

Figure 5.76. Houses at Tubusereia 1961.
Source: Peterkin (2019) (clipped).

Many more houses at Tubusereia are now land based. Nevertheless, a rectilinear form is still the most common, constructed using non-traditional materials yet retaining many of the features considered to be traditional, such as verandah space for receiving visitors. Hau'ofa

(1981) noted that among the Mekeo of Central Province, the verandah is associated with being visible and public, whereas going inside the house is moving to invisible and private space.

Dwellings over the sea are densely spaced in comparison with those over the land, having no real space to expand without establishing new walkways. Field interviews indicated some resentment from marine dwellers about being dispossessed, as most do not appear to have land tenure despite being able to trace familial lines to pre-colonial times.

Residential buildings are divided into two disparate groups: those on land, and those over the sea. As noted in Chapter 4, a separate focus group interview was conducted with the people living over the sea (see Table 5.9).

Table 5.9
Focus Group Composition Tubusereia

Location	Participant	Age	Education Level	Household
Interview conducted on 05 October 2016 at private residence over the sea in Varure Tubusereia, PNG. Three females and six males participated, including a key informant/translator who was from the village and arranged the village stay and consents prior to the field trip. One female mentor, also from the village and engaged as a companion/translator for the author, was also present as she was one of the group of people whose home was over the sea.	IDI-MS-C-01	47	High School Gr 10	4 adults 3 children 10, 14, 7 months
	IDI-FS-C-02	79	Primary Gr 3	3 adults 3 children below 10
	IDI-FS-C-03	58	Primary Gr 3	9 adults 6 children below 15
	IDI-MS-C-06	61	High School Gr 10	9 adults 5 children below 10
	IDI-MS-C-05	64	High School Gr 10	5 adults and 2 children below 10
	IDI-MS-C-04	25	High School Gr 12	8 adults 3 children below 15
	IDI-MS-C-07	23	High School Gr 9	4 adults 4 children below 16
	IDI-MK-C-03	35	Key Informant	3 adults 2 children below 10
	IDI-FM-C-10	48	Female Mentor / wife of IDI-MS-C-01	

As noted in Chapter 2, historical data shows that previously each Motu family had its own walkway extending out to sea (Belshaw 1957; Fowler 2004; Maddocks 2012). Interview findings confirmed that this practice continues, however, in the 1960s, missionaries introduced a new spatial arrangement from New Zealand that separated family lineages into separate sections of the village, each with a chief. Tubusereia thus has three distinct sections, known as Naka, over land and sea: Varure, Hisiubada, and Bisiro. This segregation has been further reinforced by the Church so that each family line attends its own section of the church for services and the like (F Daroa 2016, personal communication, 5 October).

Table 5.10
Interview: Tubusereia Housing Spatial Arrangement

Respondent	Transcript
IDI-MV-C-02	That was the arrangement in the olden days where families would live in family groups but now everyone is scattered all over the place. For instance, some of Igo's and my family members live in Bisiro (Igo's father's clan) while we live in Varure (Igo's mother's clan's side). These walkways are big now. I even walked on single logs, put on crossed poles (demonstrates with arms) and the logs were just laid on, with supporting on the side. I even walked on those things when I was a little boy. We were not allowed to walk on those things unless we knew how to swim. Because when you miss, you must swim back to the house. We would swim down from the house to the beach. Mind you there were crocodiles at that time. Our parents would be standing on the ladders that go down to the sea and they got sticks and beat the sea because crocodiles might attack us. Houses used to be on the sea only.

Although the conversation was generally positive and people seemed genuine in their love of the lifestyle, key informants later acknowledged that some things were left unsaid. For example, there have been several instances of more-educated family members living on the land who are not willing to allow their marine dwelling relatives to inherit land and, being more aware of future possibilities, are taking steps to survey and register customary land and gain title to it. This has resulted in simmering family tensions that are unlikely to be resolved.

Table 5.11
Interview: Tubusereia Dwellings over the Sea

Respondent	Transcript
IDI-FM-C-03	It's very easy living over the sea. Rubbish, toilet, even posts, boys will easily slip one over to replace, so they prefer … it's so much easier lifestyle living over the sea. I have my own space, I know my boundaries over the sea, so I prefer to be here.
Author	What about the younger generation? Would they stay or go?
IDI-FM-C-03 IDI-MM-C-05	Sometimes, if their fathers … if they want to follow their father's line on the land, they will go to the land. They will go to the land. It's either they stay over the sea or they move inland but still they've got like, we just mentioned, spaces provided on flat land or family land they'll go and settle there.
IDI-MM-C-01	If the entire people along the coast over the sea wanted to move down [from the sea], land would be another issue. So, those of us like myself, if I have land just along the road, I would be willing to move, but what about those who don't have land? So that's going to be another issue. But I believe that it is going to be quite hard for us to move.
IDI-FM-C-02 IDI-FM-C-03	They prefer living over the sea, but it comes with these hard yards. How they survive, they go to … even when it's high tide they throw a couple of hooks down to catch one or two … or even they go out to collect firewood in their dinghies or go fishing … they have to … minimal spending yeah.

In Tubusereia having a house is a personal responsibility for most and is based both on pride and necessity. Driven largely by access to land, the ability to build is subject to consultation

with clan and village leaders. A male is permitted to build on his own family land, however if he wanted to build on his wife's family land, he would need to seek permission from her father and brothers.

Table 5.12
Interview: Tubusereia Housing Typology

Respondent	Transcript
IDI-MV-C-02	I own the home I live in and I helped build the house with the help of my three other siblings working then in 1978/1979. We had my father's small house in the same location. We saw changes happening in house construction with bigger houses and modern materials such as corrugated roofing, fibro walling so we decided to chip in to build a bigger house which is about 30 by 20 metres. Everybody generally wants stilt house. I think ventilation. They like to use the bottom (underneath the house). Every person who walks around there will make a decision to walk into my area, because it's higher, there's no fence and it's cooler. And we like to have our house open to people. That's the Melanesian custom. We have a kitchen. We have a fireplace and a gas stove. We use the fire stove a lot. We leave the gas for tough times during rain etc. Water is scarce and is carried to the house by bucket. There is no reticulated water. We have a bathroom upstairs. We have a little tank (a 1000 litre water tank built by Hebou Constructions). I can't wash in the sea. Too salty. In the old days we had no excuse. We used to wash in the sea and use fresh scraped coconut to rub all the salt off. Good for the skin.
IDI-MK-C-03	A lot of people living over the sea depend on this lifestyle; even for sanitary issues, even though it might not seem hygienic from our perspective, even the people living on the land use the facilities to throw their rubbish, so even people living over the land need them as much as … most of the population use the sanitation over the sea so … they need help when they use the facilities over the sea.
IDI-FM-C-03	Gradually people are seeing it becoming an issue. Obviously, they've lived it but are hoping their kids will not live over the sea at some stage down the line. People have been educated now about hygiene, toilet, rubbish, but issues still rest with land you know. This is all customary so … that's why most of them would still hesitate to move because they would not have that access … free access to …

Whether dwellings are marine-based or land-based appears to have little bearing on housing typology. Results of surveys support the general opinion expressed that highset houses are preferred, as was customary and noted by Oliver (1997: 1172) in relation to the Motu:

- Built on platforms on seashore or riverbank,
- Positioned on pilotis (piers or stilts),
- Positioned adjacent to board bridges which link dwellings to land.

Little evidence of any traditional building materials was observed by the author, and it was only towards the end of the field trip that two builders with any experience of traditional building were identified. It was remarkable to note how animated the conversation became at the thought that there was interest in the significance of their long-forgotten skills. The builders expressed a desire to pursue a tangible research outcome, perhaps even being able to revive the old methods by mentoring university or technical college students interested in learning the craft.

Table 5.13
Interview: Tubusereia Traditional Buildings

Respondent	Transcript
IDI-MM-C-01	(Speaking in Motu and describing with gestures a bowed roof for full height of building). In the past Tubusereia house roofs were the *kurukuru* (*kunai* thatch). Roofs (*guhi*) in the past, went from the top right down the sides and continued down to form the walls (*haba*) - not only here but the other villages as well - yeah, still on stumps. Last one built in 69. But some houses still had *kurukuru* until the 70s
IDI-MM-C-01 IDI-MM-C-02	When you start, go and cut posts *(duhu)* and on return put the posts in the ground. Once all the posts are up then you go and get the bearers *(itari)*. It's a traditional house so everything has to be traditional material. Then you go and get the *(au tadi)* mangrove wood and you use *(hadae)* studs. Then you put the *(daga hanai)* ridge beam. Then you put the *(rohu)* rafters across. Then you put the top plate *(ototo)*, *(magani bada)* barge board. It takes many people. Material is not in one size; material is green when they bring it, and it has to be worked on – skin removed and cut into size. They don't use saws – they use an axe and knives. In old times they used stone axes.
IDI-MM-C-01 IDI-MM-C-02	After you get everything ready you have to go and look for string – bush vines *(sei).* Not just ordinary string – a special string. And a big feast afterwards. The job is not done by one person because the *kurukuru* has to be cleaned and tied and handed up … (Demonstrating with gestures and speaking Motu). So, the top one they fold over after they've brought it up and under then they bind it to the bottom lath. So, every second lath has binding and the alternate one has the *kunai* folded over. The very last thatches just have two sticks to tie it down to stop the wind blowing it.
IDI-MM-C-01	What I want to say is maybe people like you with a lot of knowledge, if you could come and we can get some young boys and then we could show the way to build one of the traditional houses and you can see how it is built then you can write it down and the skills would …

When questioned about the reasons for moving away from traditional building, a range of suggestions were made but generally it appeared to be the '*excitement of [what white men] had; colonialism*' rather than a rejection of social values. In retrospect, those participants who were old enough to remember living in a traditional house personally preferred the ambience of them saying '*that type of house is nice and cool inside*.'

The term 'traditional' is used here as it was described in interviews and survey questions. In other words, it seemed to the author that for the participants this meant housing that was linked to the social function within the village setting rather than any specific materiality. From a social perspective, although there was little evidence of traditional materials being used in building, verbal and observational data indicate that the way of life, and thus the spatial characteristics of houses draws on traditional values. Family groups still build close to each other, adhering largely to their traditional 'lines' or sections. Although Tubusereia is classed as an urban village in the sense that it is close to Port Moresby, with a regular PMV shuttle, because it is customary land, no building regulations apply. Agreements regarding land usage for housing continue to be according to clan at Tubusereia. In the absence of any available traditional materials, skills or even desire to return to traditional housing, most buildings are constructed from scavenged materials or those bought from a reputable supplier (usually employing a *wantok*).

Table 5.14
Interview: Tubusereia Material Procurement

Respondent	Transcript
IDI-MV-C-02	During my time as a small boy we would go and collect materials with the older people. And I can actually remember what we built with. The posts, the stilt posts that are used now, there's a choice between many different trees that grow there. I know which ones to go for. Not too much Mangroves were used. Only used for temporary shelters, but for permanent posts, yes, some Mangroves, the Bruguiera[63] types. It's a straight tree that grows in the mangroves and it's stronger, (possibly Bruguiera *cylindrica)* and when it dries it's stronger. But those were not used for posts, they were used for beams. They stayed there for more than 50 years use.
IDI-MV-C-02	They used similar framing system to modern building methods with thatching along the sides. They were wild sago leaves known as nipa palms, fruiticans (Nypa *fruiticans*), on the walling, but roofing was *kunai* grass. *Kunai* is tied up and the heads weaved in first under rows of little thin strips and tipped over and working from bottom to the roof top. It was very interesting when I saw the corrugated roof being laid, it was done in a similar way. The thatch was done in a similar way starting from the bottom. All these people knew what they were doing.
IDI-MK-C-03	[Now] most building materials are purchased through a very well known, hard-working firm called Plumbers and Builders. They've been around Port Moresby for a while.

[63] Information regarding the species provided by Felix Daroa, local conservation practitioner and Queen's Diamond Jubilee Commemorative Award recipient for services to community and country. Daroa's expertise is in protecting, replanting, rehabilitating and conserving mangroves and the marine environment in Tubusereia. He holds a Certificate in Biodiversity Conservation from UPNG.

Builders and home owners who were interviewed confirmed that in the contemporary context the first arrangement is for the owner to negotiate with the carpenter/builder, for a full material list, to help the owner organise the required materials for construction, along with a quote for the work. The owner organises everything including the payment and delivery of all the materials for construction to commence.

There are no formal plans or contracts, and there are no building regulations for construction on customary land. It is up to the builder to recommend the required material sizes and quality, based on trust and communal support. Usually the builder is someone from the village, is related to the owner, and therefore under obligation to provide the best possible outcome. In many ways, despite the unofficial and undocumented nature of the arrangement, it is akin to a 'design and construct' contract.

Although it is evident that traditional materials are no longer used in contemporary housing, and that nowadays most materials are purchased from commercial suppliers, nevertheless the way of doing business appears largely unchanged. Most arrangements are made through family contacts, who are expected to take special care to pick the best quality products; '*that's just how things are done in PNG*' (IDI-MK-C-03).

Larger houses are more desirable now, compared to older traditional houses, and many of the respondents indicated that the size of the house is more important than access to better facilities, perhaps a visible demonstration of status.

To help trace social change, photo elicitation can act as a stimulus for visual discourse and to add an additional layer of information to empirical data (see section 4.1.2). Consequently, village leader Felix Daroa was shown photographs taken in the 1960s for context regarding changes in Tubusereia housing and village layout, and specifically the comparison with what people are comfortable with in the contemporary setting (Table 5.15). Considerable beach erosion was noted, with the opinion from respondents that corrugated roofing was responsible because it was phased in without provision for downpipes, water tanks or any form of stormwater drainage infrastructure.

In recent times, NGOs have sought to provide water tanks to mitigate the effects that lack of clean water has on health within the community. Despite this, major infrastructure for water or sewerage is unlikely to be provided by the Government. To a large extent a sense of dependency has infiltrated many villages, especially those more exposed to Western urban influences, such as Tubusereia. Although there is a desire for modernisation and improved living

conditions, there is, at the same time, a belief that such improvements should be provided by the Government. Moreover, some people have simply not developed the skills to be self-reliant.

Table 5.15
Interview: Tubusereia Change and Continuity

Respondent	Transcript
Author	And you said you had lived in one of the last traditional houses?
IDI-MV-C-02	It was a semi-permanent house, with some local materials and modern materials. My house was one of the 4th or 5th house with corrugated roofing. I can point out where my house is if I see an old photo of the village. My house was a small house (looking at photo from 1960s). This is my house. And this is the hill we are on now. (Before it was excavated and Igo's parent's house built). Our grandfather's house used to be there in the middle over the sea (pointing at houses over the sea). And he said, when I die you break this house up and share it with all brothers and sisters. My mother happens to be the eldest daughter of that particular man, so half of the house was given to my mother; not half, but some big share.
Author	You can see here these ones are still thatched.
IDI-MV-C-02	That's right. These are still thatched. Right here is my house now. From here you would walk to the beach and this beach goes down; I used to play around; we used to catch fish here on the beach. You know during some lunch breaks and things we would come and there were stones, coral reef here in the village. We would catch fish, put them in little tins, cook them, eat them and go to school. This village, as we walked down the beach people standing here would start losing sight of our heads. And as we go right to the bottom here, they would not see us from the top here. So that's how steep it was.

Costigan (2014) suggests that sustained community self-development in PNG needs relevant processes and technology, and an understanding of cultural drivers and aspirations, rather than subsidies or financial aid. His opinion, after many years' involvement in architecture in PNG, is that '*the practice of delivering 'Cargo' subverts self-reliance' (*K Costigan 2014, personal communication, 1 June).

Nonetheless there is a sense that while the physical structure of buildings and the materials from which they are constructed have changed and continue to evolve, the underlying social structures of land ownership and clan loyalty remain seemingly intact, making it difficult to reach any consensus on housing outcomes.

Custom and customary land ownership in PNG are constitutionally recognised, integrated, and continue to be strongly practiced through customary lineage systems, leading to discontent from those who are at the periphery and hegemony by those at the centre. Most PNG people still experience a sense of conflict between traditional and modern ways of life.

'*Many people are caught between traditional and modern societies, and in some cases, people have difficulty in coping with the demands and obligations of the receding traditional society, and the demands and expectations of the emerging society. This creates a situation of divided loyalties*' (Waiko 1993).

5.3.2 Common Characteristics: Tubusereia

In terms of form, stilt houses are still the norm (preferably built on land) because they are said to be more suited to the warm climate and the Motuan lifestyle. Several participants indicated sadness at the loss of traditional knowledge and building skills, but agreed amongst themselves, that a hybrid model that incorporates '*the best of both worlds*' is the future aspiration.

PNG is a land of many contrasts and yet there are common threads that address the dynamics of activity and the social constraints that determine how housing requirements change and are adapted. Most coastal housing is on stilts, with living and socialising on the verandah, and only sleeping inside. People aim to build as high as possible on land so that they can use the underneath of the house but also to make the most of the breezes and views.

Houses need to be large to accommodate the flux of family life; sometimes children stay with grandparents for up to four months while their parents go away for work.

In earlier times traditional houses had a hearth in the centre. Placed on the floorboards, it was made of split banana trunks covered with clay, and was a sacred space where children were expected not to play. The last house with a central hearth was at Pari village and was thought to have been replaced in about 1966 (Maddocks 1976).

Although some homes now have kitchens inside, preference is to cook outside on the verandah or in an extra lean-to, using a wood fire, regardless of whether the house is on land or marine-based (*Figure 5.77*). Several respondents said that in addition to saving on electricity or gas, they preferred the taste of food cooked over the fire. Moreover, families gather for meals and to share whatever is available before retiring to their own homes. In this sense, the verandah has remained a quintessential feature of coastal housing.

Figure 5.77. Iubu Kedea preparing leaves for sago pudding (by author).

Marine-based houses are tightly grouped, with little room for expansion and seemingly few options to move on to the land (Connell and Keen 2018). Shown below in *Figure 5.78* are the crowded conditions observed by the author during focus group interviews with respondents living over the sea. Repairs to the walkway are being undertaken using traditional methods. Mangrove logs were sourced from customary land and soaked in the sea for several days before being placed.

Figure 5.78. Housing density over the sea (by author).

Land-based residential buildings by contrast generally have a reasonably dispersed settlement pattern, corresponding to the entitlement, through patrilineal decent, of those who moved onto the land several generations ago. Typical examples are shown in *Figure 5.79*. It should be noted that the closer to the sea, and the associated centre of social activity, the more densely grouped the houses are. In this sense the settlement pattern at Tubusereia is little different to urbanisation elsewhere in the region.

Figure 5.79. Housing density over land (by author).

5.3.3 Field Observations: Tubusereia

The absence of running water, rubbish collection or an effective sewerage system are immediately evident in Tubusereia. Most houses have electricity, but the supply is unreliable and intermittent. What is also clear is the social demarcation between villagers living over the sea and those on land, as well as a generational divide between those villagers brought up under the Australian Administration and those born after Independence in 1975.

Walkway lines can be viewed as an indication of the continuity of traditional architecture, at least in terms of function. Marine dwellers regularly repair the walkways or replace stumps for houses using similar methods passed down through generations, including the procurement of timber stumps from the rapidly declining mangrove stocks. Nevertheless, many of the traditional skills have been lost. The desire to maintain a lifestyle that includes land tenure, provision for communal living, a large highset house with good views and useable undercroft space, were thought to be most significant from the point of view of the villagers.

It is often the case that land is claimed according to word of mouth. Landmarks are placed to lay claim and only adjusted if there is dissent (or *'grumbles'* as they are referred to). Younger people expressed a desire to live according to life today. *'If you have the income and strength you will try to get your own home. Even if you have to work away to pay, another family member will live in the house and take care of it'*. Following is a selection from photographic records of construction observed during the 2016 and 2017 field trips (by author).

5.3.4 Marine Dwellings

Typical marine dwellings are constructed from recycled materials, usually fibre cement sheeted walls and corrugated iron roofing. Although most have a shallow gable roof and verandah as traditionally built, the homes are larger and have windows and other modern inclusions.

Figure 5.80. Marine dwellings.

Walkway posts are replaced using manpower. While one man dives down to guide the post, the men above lift and drop it until it is firmly fixed.

Maddocks (1976) claims that in earlier times holes were generally dug with a stick while the tide was out.

Figure 5.81. Ocean pile driving.

Ablution facilities vary widely in form between land and sea homes however, with no sewerage system in place, the result is the same: the ocean. As stated previously, sanitation is becoming a serious issue. Although education about hygiene and rubbish is well regarded, the lack of available services for disposal means that little is done to resolve the problem and people revert to customary ways of managing, despite the population growth and subsequent worsening situation.

Figure 5.82. Outhouse.

Rainwater is the main source of fresh water for cooking and washing. The houses over the sea generally collect it in drums, while those on land often have large poly tanks; these are either purchased by those who have the means or provided by international aid groups from time to time.

Figure 5.83. Water drum.

5.3.5 Land-based Dwellings

Figure 5.84. New build.

For villagers with land tenure and job security a new build will be undertaken by a builder using purchased materials as funds are made available. This can take several years but does not preclude occupation of the premises during construction. Highset is preferred, allowing for undercroft space and breezes. The size and form of the house is considered modern, reflecting the status of the owner.

Figure 5.85. Power supply.

Although mains power is available in the central village area, it is somewhat unreliable and for those outside the centre of the village alternative connections are made. Many villagers have no power or use torches and solar LED lights. Even those with access to power need to work around the daily power failures that can last for hours.

Figure 5.86. Modern kitchen.

Some residents have more modern kitchen facilities, but these are rarely connected to any services (water/electricity) and are generally only used if the weather is bad.

Figure 5.87. Modern WC.

A modern ablution area: flushing and washing is by bucket carried from the water tank area. Waste is piped directly to the ocean but close to shore, as is common practice in coastal villages.

This small pensioner cottage on the outskirts of the village is a typical small self-built residence; a single room with verandah and understorey living space. Food gardens are common for older villagers. In this case the owner, Gari Ranu, chose to move away from the village centre for *'peace and quiet'*.

Figure 5.88. Pensioner Cottage.

A privacy screen of some description and bucket washing is the most common means of bathing for most of the residents.

Figure 5.89. Bush shower.

Cooking in most cases is by wood fire, even if a more modern kitchen is installed inside the house. Most people interviewed expressed a preference for the taste of food cooked over an open fire.

Figure 5.90. Cooking facility.

Traditional builders are rare. Only two were located during fieldwork in 2016. Here, artisans from different generations, Roy Hanua and David Mahuta, discuss the passing of an era and a desire to share their knowledge with researchers if the opportunity arises.

Figure 5.91. Traditional builders.

5.3.6 Tubusereia Village Architecture and Settlement Patterns

When showing the relationship between the built structure and the urban fabric, *'figure ground'* is one visual method often employed. In this case it is used to reveal changes in density over time (Desimini and Waldheim 2016). Frank Hurley is thought to have taken one of the first aerial photos in PNG at Tubusereia in 1922 (Specht and Fields 1984). At that time, all but one house was part of the marine village. The housing over the sea has gradually expanded at Tubusereia, but so too has that on land.

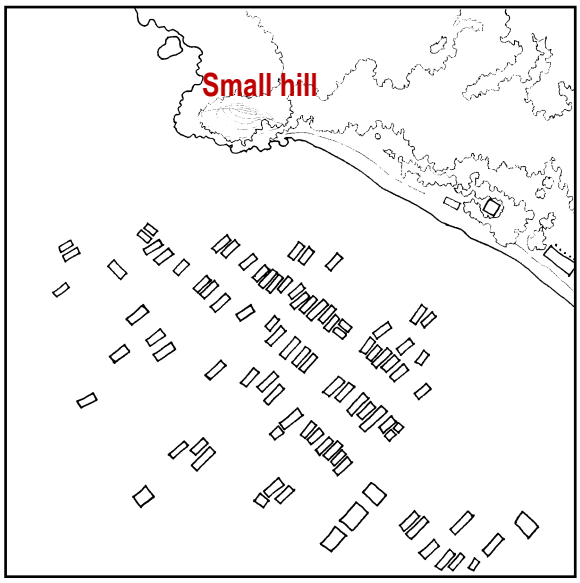

Figure 5.92. Tubusereia Figure Ground 1923.
Adapted by author from Hurley, in Specht and Fields (1984).

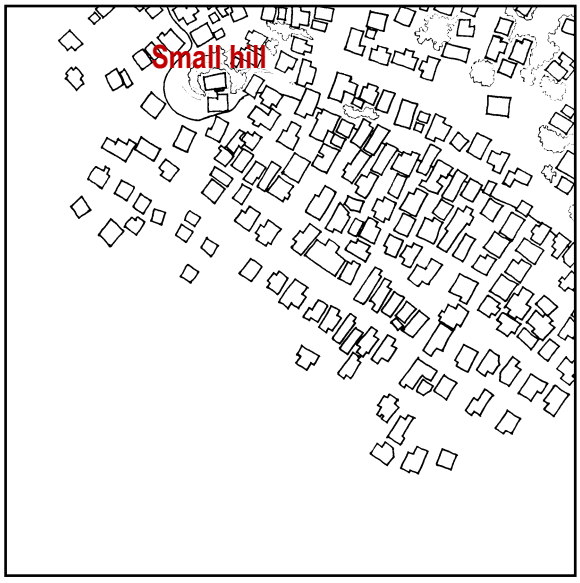

Figure 5.93. Tubusereia Figure Ground 2017.
Adapted by author from Google Earth.

The progressive move away from traditional materials can be seen in the following temporal images *Figure 5.94*, *Figure 5.95* and *Figure 5.96* at Tubusereia.

Figure 5.94. Tupuselei from the small hill c 1905.
Manning (1905). Courtesy of Mitchell Library, State Library of NSW.

Figure 5.95. Tubusereia from the direction of the small hill 1976.
Source: Bill Gammage Collection. Courtesy of Pacific Manuscripts Bureau.

Figure 5.96. Tubusereia from the direction of the small hill 2017.
Source: By author (drone pilot Bernard Bouraga).

Tubusereia is very much dependent on the money economy, with several villagers commuting to Port Moresby for work. The choice to remain living in the village is both social and economic. Even with a regular salary, rents are unaffordable in town and purchasing a house is out of the question for many. However, it is the social aspect that seems to be the more influential, a fact that has not changed since the Stretton (1979) report on urban housing policy.

Stretton noted that housing policy since PNG Independence had created several groups with vested interests who were resistant to an equitable distribution of economic benefits and argued the need for a rationalisation of the housing industry towards self-help housing and the use of local building materials unsuitable for export (Stretton 1979: 67).

Table 5.16
Interview: Tubusereia Family Group Housing

Respondents	Transcript
IDI-MV-C-02	I have land, but I prefer living in the group house, like our forefathers, we have always lived in group houses. Some, if they want to move forward, they move out, but we don't force people to move out. It's not our custom that we move our mature children away. Sometimes it gets really tough in terms of food on the table – we have so many of them and you can't feed all of them. But most of our food that we eat during the day is a sort of collective thing – somebody throws a ten kina out and then it happens. Otherwise the parents would be the common provider.
IDI-MV-C-02	I think it's 'home sweet home'. I'd stay in the village. My children also want to come back to the village but if working in town they would want to live here and work in town. But some of them have been offered house. I'm talking generally. Some of them have been given houses in town through their workplace, which is a requirement if they have to live in town, but every weekend they're back here. I like that it is big; we were lucky that it was a big space. There were not many houses at that time, and we covered a big space for ours. A lot of houses are coming in now making it crowded (demonstrating with gestures) but at that time we had a lot of space to move around.
IDI-MK-C-03	The lifestyle is that most young people prefer to stay with parents and wait for parents to go (pass away) and then quietly take over their homes.

Several respondents work in Port Moresby, primarily in the public service or finance sectors, and are provided with housing in the city, yet on weekends they choose to return to the village. One of the suggested reasons is to ensure their claim to customary land continues for future generations. Building a house in the village is one way of confirming such claims for those who have an income or the ability to borrow money. More importantly it indicates that extended cultural lineage and its attendant web of social relationships is the norm that permeates both traditional and emerging lifestyles and exerts a high degree of impact on the built environment.

In contrast, the negative effects of *wantokism* on those who have an obligation to less fortunate family members, have also been made in relation to housing affordability and overcrowding (Seniela, Babarinde and Holis 2019).

Fieldwork observation noted several substantial homes in prominent positions in various stages of completion. It is not unusual for homes to take several years to build as funds become available, but as there are no legal administrative controls in place it is also possible for the owners to occupy the houses regardless of the state of completion (see *Figure 5.97*).

As Turner (1967: 167) stated, *'Observations of what ordinary families in urbanizing countries do, when they are free to act as they will, show that they prefer to live in large unfinished houses or even large shacks, rather than in small finished ones.'* Similarly, Langmore and Oram (1970) showed that most people living in and around Port Moresby, if given a choice, preferred a large low-standard building rather than a small, higher-standard building. Moreover, Stretton (1979) noted that self-help housing in villages and settlements is the main form of accommodation and that the size and type of house is primarily dependent on land tenure, income and attempts to maintain close links with the village.

> *Initially it may be small and fragile, but in most cases the size and standard of construction improve with time. The owners either purchase materials from retail shops or friends or use their own labour to collect material from dumps or other such places. If the owner cannot construct the house himself, he will hire carpenters and labourers (Stretton 1979: 53).*

Evidence from this research in Tubusereia, shows that in the transition to urbanisation, housing is a means of social mobility, particularly when land tenure seems secure. Self-help staged housing, built with purchased or scavenged materials, is still the norm for those with a modicum of cash income and the customary rights to land.

Figure 5.97. Private housing on customary land.
Source: By author 2016-2017.

5.4 CONCLUDING REMARKS

In summary, this chapter presented the results of interviews and field observations, along with confirmatory evidence from the literature. The findings show some common threads as well as several differences in housing between Kunguma and Tubusereia.

To be able to understand the changes in housing for both villages, it was necessary to delve not only into the pre-colonial history outlined in the literature review, but also into the more recent past as it relates to change and continuity experienced by the people and described as part of their living memories. The findings of this chapter will provide the basis for analysis, where qualitative data is analysed in two sequential sections related to the two embedded case studies, Kunguma and Tubusereia.

Chapter 6: Qualitative Analysis

6.0 INTRODUCTION

Qualitative data analysis is a process that enables conceptualisation of meanings that help answer the research questions. While observation and participation can help describe and provide comparative perspective to the questions of what constitutes traditional architecture, it is through listening to the things people say about the past, their present thoughts and feelings and their hopes for the future that we can begin to understand how these future aspirations may be reached.

This chapter presents the results of qualitative analysis based on empirical data obtained in the field and documented in Chapter 5: Case Study Results and Findings.

6.1 COMMON THEMES ARISING FROM THE QUALITATIVE DATA ANALYSIS

Galletta and Cross (2013) suggest a structured approach to analysing interviews which was found to be a good fit for the MaxQDA software used for this research analysis:

- Analysis: breaking down data into thematic codes.
- Synthesis: drawing related codes into categories.
- Movement Towards Conceptualising Meaning: exploring thematic relationships in response to research questions.

The use of MaxQDA software facilitated comparisons within and across the selected research cases, and the coding of interview transcripts to address specific research questions (Saldaña 2016; Woolf and Silver 2018). Using MaxQDA allowed the iterative coding of volumes of text that led to the identification of several overarching themes.

Table 6.1
Coding Themes Generated using MaxQDA

1	Specific aspects of traditional architecture in modern Papua New Guinea
2	Modes of living: architecture of community
3	Knots and boundaries: respecting the past
4	The spaces in between: housing as more than just shelter

6.1.1 Specific Aspects of Traditional Architecture in Modern PNG

When defining traditional architecture in contemporary PNG several common themes emerged that related directly to what constitutes a traditional home in the opinion of the participants.

Table 6.2
Participant's perceptions of traditional architecture in the two case study communities.

HIGHLANDS CASE STUDY	COASTAL CASE STUDY
Traditional house is comfortable and warm.	Traditional house is cool and comfortable.
It has a fire. The central hearth is an important aspect. It is where people gather to talk.	It has an open verandah where visitors are always welcome.
It is built on the ground which is better for warmth during the cold evenings and for reducing exposure to cold winds.	It is built on stilts either over the water or on land for cooling ventilation. The underneath of the house can be used for shade, shelter or storage.
It has a high-pitched roof through which the smoke from fires can dissipate and space where firewood can be kept dry.	It has a high-pitched roof through which heat can escape and space where items can be stored.
In Recent Times / Transitions	
Materials are locally sourced usually from the bush. Some nails and plastic are purchased. Some roofing and walls are metal.	There are very few locally sourced materials available.
Built with the help of immediate family members and other villagers, as necessary. A clan leader usually directs the planning and construction.	Built with the help of a carpenter to supervise with no regulations and based on a handshake agreement.
There is a separate cooking house, even if the main house is 'modern'.	Even if there is a kitchen, most cooking takes place outside.
There is a pit latrine, even if the house is 'modern'. Few houses have flushing toilets.	There is a latrine over the water, or if on land is piped into the ocean. Some have flushing toilets.
Bathing in the nearby river or drum water.	Bathing in sea or tank water.

From interview conversations it was deduced that whether a house is regarded as traditional, or not, is intimately linked to its social function and emplacement within the traditional landscape of village or village-like settlement. The ideal home should be able to accommodate the extended family, no matter how long they intend to stay.

Interview and survey responses indicated that modernity in terms of housing appears to be defined by how closely the physical form, materiality, and facilities such as running water, sewerage and electricity emulate the houses designed for nuclear families in planned suburbs.

The concept of modernity can be defined in different ways. For Berman (2010) it is related to peoples' sense of being modern. Yet modernity in developing countries is identified according to Western values and consequently thought to engender a break with traditional values. As this research shows, in PNG the concept of what constitutes a modern home is merely an emphasis on the use of industrially produced materials and imitation of *'styles'* from a variety of sources, while socio-cultural elements of housing remain essentially intact. The social status of owners of modern houses increases, but exists in concert with traditional spatial, social, and cultural norms and values.

6.1.2 Modes of Living: Architecture of Community

While Kunguma and Tubusereia are divergent in terms of their architectural forms, within each community there is relative consistency. Furthermore, it is evident that housing is more than the physical structure, but a complex representation of social and cultural values established over time.

One of the issues with undertaking an ethnographic study is that often people do not discuss what they think is self-evident in their daily lives and therefore it is important to move beyond representation, to insights about the value or meaning behind a common mode of living that is tacit within a community. Important milestones in the process of building are marked by rituals such as the turning of the first sod, for example, or the completion of the roof. Such social conventions are represented through architecture and enacted through the process of building, although identification with place is potentially of greater importance.

People's placemaking, at both field sites, is intimately tied to their cultural and social values. Thus, at Kunguma, attention is paid to the importance of the setting not only because it is culturally significant but also for pragmatic reasons – fertile soil, space for gardens, proximity to water supply and position within tribal boundaries. At Tubusereia on the other hand, although space is equally important, it now represents, more explicitly, ownership and prestige. Few people use the land productively, while those living over the sea rarely have access to land and need to rely on the generosity of family when there is no money to buy food or pay school fees. Nonetheless, the attachment to the village and associated social bonds is strong.

That housing is a basic need for both communities is without question; their architecture is a visible sign of the social conventions of the time and the spirit of place.

A central hearth dominates not only the *haus man*, but also the separate *haus kuk* and the women's houses at Kunguma. It is used for warmth, cooking and as a focus for family – a private intimate place within the enclosure of home. Meetings or gatherings take place in the *haus kuk* which, even if the main house is non-traditional, is usually a separate building. In some families with more than one wife, the family eats together in the *haus kuk* although the women have their own separate houses to which they retire at night. All but three of the 119 Highlands households surveyed had a separate *haus kuk*. The interconnection between architecture, kinship ties and social practice is clear in the norms practiced by the community at large but it is evident that traditional values and the desire for modern houses are not necessarily mutually exclusive in PNG.

Similarly, at Tubusereia almost all the households surveyed (20) and those casually observed, cooked outside with wood-fired facilities of some kind, usually a cut-down, forty-four-gallon drum. The extended family eats and sleeps inside the home, but the place for socialising is the verandah. Traditionally Motu houses had a front verandah, and this was also observed to be common practice during fieldwork. It is a cool, shaded space from which to listen to the sounds of village life and keep abreast of what is going on in the village community. From their verandahs people can call out to each other, sharing gossip and concern for the community. When writing about Pari, another Motu village, Maddocks (1976: 5) noted that verandahs were important because they *'allow the householders to participate in the ongoing occupation of knowing your neighbour's business, which is a central feature of the village life all over the world'*.

6.1.3 Knots and Boundaries: Respecting the Past

Typically, a new house whether traditional or contemporary, Highland or Coastal, is positioned in relation to kinship ties and with the agreement of a lineage group. Thus, if as Semper (2010: 15) posits, the primary task of architecture is the determination, delineation and enclosure of space, knots are the symbols of the complications and contradictions between the visible construction processes and the invisible social values. These values are still steeped in the past, while being drawn inexorably into the present.

There is a symbolic tension in knots; although they may offer security by holding things together, they can conversely be a sign of bondage. Writings by Semper (2010) suggested

buildings and textiles were interrelated as human arts, wherein knots are a fundamental principle of coherence. As a structural configuration they join disparate elements into a coherent whole; as a symbolic configuration they can represent the ties of kinship and social cohesion, or as Hauser-Schäublin (2011) notes, the interplay between revealing and concealing in the looped structure of the *bilum.*

Ingold (2015) also relates knotting as a symbol of human kinship and affinity, likening the memories of past connections to the kinks and bends of loosened knots, an entanglement of lines, loops, and crossings.

> *But if you untie a knotted rope, however much you try to straighten it, the rope will retain kinks and bends and will want, given the chance, to curl up into similar conformations as before. The memory is suffused into the very material of the rope, in the torsions and flexions of its constituent fibres (Ingold 2015: 25).*

In both communities, the importance of the ties that bind extended families dictates housing patterns. In the absence of any government support, the family unit is the most significant provider. People identify with family first, then tribe, then province and finally as Papua New Guinean. In this regard, development studies seem to be out of step. Emergent themes of participatory and/or sustainable development, while admirable and well intentioned, have hardly made an impact on housing provision. Colonial laisse-faire policies, regardless of whether due to Australian budgetary restraint or because PNG was merely a buffer from other *'geo-political threats'* noted in Chapter 2, means that the people of PNG have always provided their own housing, in one way or another, within their means and their access to available materials.

> *The reluctance of people to participate in 'self-help' or 'community' activities is one of the reasons that many projects that depend on an assumed communitarian sentiment fail in Papua New Guinea. The 'community' as a singular, locality-framed, and village based entity is a colonial artefact, and in many villages in Papua New Guinea different social divisions (such as clans, families, or other genealogical lineages) within a village provide the strongest basis for mutual support and group action (James et al. 2012: 240).*

The complexity of social connections in PNG is confusing to those without the lived experience; there are many different opinions both idealised and demonised. As discussed in

Chapter 2, most people thought about PNG traditional societies as an essentially egalitarian form of communal living. Narokobi (1983) couched this in terms of the Melanesian Way. The same sentiment was expressed in both of the fieldwork communities, however (May 1997: 27) suggests the Melanesian Way is primarily philosophic and semantic. Others have suggested it was a political construct in response to the need for a unified Nation during the move to Independence, while Hau'ofa (1981: 4-5) writing primarily about the Mekeo of Central Province says that for Melanesia, as for other traditional social groups, the two opposing yet complementary principles of equality and inequality exist, varying in emphasis according to the organisational and structural relationships within each society.

The following post-interview discussion confirms the strength of clan ties, but also the layering and complexity that exists between clan, family, and individual entanglements.

Table 6.3
Participant's perceptions regarding family and community – Highlands Case Study.

Respondent	Transcript
IDI-FK-H-01 (Key Informant)	... it doesn't matter who you are, there's always someone who's going to take you in and who's going to feed you and who's going to ... you might not have the best of what a child in a family would have but you'll have something. There's nobody with no roof over their head. So, the extended family is always there and always willing ... provided you do what's expected of you ... like ... you have to pull your weight you know ... do your garden, do your chores. ... we have to believe that we're whole. We're OK. Even if we live in a *kunai haus* and we don't have running water and we don't have electricity, we're fine the way we are.
IDI-FK-H-02 (Key Informant/ Anthropologist)	Why do you think co-ops don't work? This is a good question because there is an idealistic view that you also have because you see it ... people cooperating, doing things together, and so you could easily take the view that 'oh these people are really cooperative and they do everything together and they share everything ... so why not a co-op then? Co-ops are about that sort of thing?
IDI-MR-H-08	There is a real dichotomy. There's a real socio-centric lifestyle between this and extended family to your village but then your land is so individualistic it's nearly like a possessive individual. That's really interesting.

The dichotomy referred to is related to the working relationships in Highlands societies generally, which are founded on continuing legitimacy and engagement based on the reciprocity and social connection of gift exchange. '*Melanesians see work as an expression of one's commitment to a specific relationship* (Graeber 2001: 41). In other words, the established traditional means of social exchanges, and the continuing engagement in these transactions, takes precedence over the concept of an economic cooperative commodity exchange.

Some Highland villagers speak with pride about their ability to build a traditional home for themselves and their families and to pass on their skills and knowledge to the next generation. Traditional builders solved design problems as they came up, using the tools and materials at their disposal and guiding the next generation with verbal instructions and through example. As one respondent noted at Kunguma, '*where I grew up in that kind of era, my mother and father, they taught me. So, when I got married myself, I had to build just more exactly like this.'*

At Tubusereia on the other hand, where traditional skills have largely been forgotten, most people expressed a desire for what they considered to be modern homes for only two reasons: practicality and prestige.

Being modern means grappling with the dilemma of how to balance obligations to your family and community with the notion of individual autonomy. There seems to be a clear understanding that there is value in retaining traditional knowledge, and a need to respect the past, while acknowledging that there are also benefits to moving with the times, providing it is on their own terms. The way forward seems to be in drawing on both traditional and modern ways, progressing with the past in mind while looking to the future. In the absence of government support, this equates to being willing and able to care for the young, infirm, and old at home. Therefore, homes need to allow for a wide spectrum of choices.

Table 6.4
Participant's perceptions regarding family and community – Coastal Case Study.

Respondent	Transcript
IDI-FK-H-01	I sometimes call our custom a funny custom. But my father told me not to put a fence around the house; don't put a fence around until I die. But a house without a fence is an inviting house; that invites people to come. And we like to have our house open to people. That's the Melanesian custom. But I sometimes see it as a funny custom because sometimes people bring in rubbish and sometimes there's bad people walking in. And you can be at peace but at times these people walk in and spoil your day.
IDI-MS-C-05	Actually, the lifestyle has changed. Now, from my perspective, our fathers or grandfathers died away and they basically lived on subsistence farming. Now that that's gone from my line of people, when we started working for a salary, I was going down and buying my rice and forgot about garden. It's really strange.
IDI-FS-C-02	Before it used to be … I mean it's a common practice … this village used to be a very lovely, very hospitable … don't see that anymore. Even coming up from the boardwalk before would be … used to have a very communal lifestyle, fishing, gardening … … the current population is forcing people to shift from communal lifestyle to self … it's very sad. Population has a big part in determining …
IDI-MV-C-01	In the old days men and women worked hard fishing and in their gardens. Not like today. People are dying young due to their lifestyle. They are growing old too quickly from wrong diet and no activity. By thirty they have big bellies. They drink too much home brew and laze around chewing *buai*.

Among the older generation there is an expectation, especially those who fulfil their kin-based obligations, that it is the child's or younger siblings' responsibility to care for older people, so that no one is left to suffer alone, however many of the older people in coastal villages decry what they see as the waywardness of young people these days. Responses to questions about the use of community space, elicited a general view that things were better in the old days of the Australian Administration. '*People have got greedy and any Aid money to provide for better facilities disappears*'.

6.1.4 The Spaces Between: Housing as more than just shelter

While housing transformation is evident, most people expressed a desire for what they considered to be modern homes for only two reasons: practicality and prestige.

The value placed on outdoor space continues in villages. A central open space remains the most common aspect of PNG villages and settlements. In the Highlands this is usually the singsing ground, while in Tubusereia and other coastal villages there is the beach or a centrally located shady tree adjacent to the main thoroughfare, under which most meetings and selling of *buai* (betel nut) or other goods takes place.

Horizontal densification seems to be limited to villages and settlements such as Hanuabada that have gradually been squeezed into remnant pockets of land, or as in the case of people living over the sea at Tubusereia, because there is simply nowhere else to expand without access to land. Nonetheless, an abiding sense of attachment to place and community was evident throughout this research and it challenges the view that customary land tenure in PNG is contrary to the desire for development. Rather, for both communities, the retention of rights to customary land provides a sense of security and self-determination.

To achieve culture-specific housing, as Rapoport (1998) points out, requires looking at housing in a holistic way, including space, time, meaning and the ambience of the setting, of which the built form is only a small part. Observation during fieldwork for this research showed little physical evidence of boundaries, fences and the like, yet people knew and understood the significance of certain spaces, the non-physical barriers and the paths and nodes for meeting and passing through. Community structures are typically *'unseen'* when considering the intervention of housing provision, yet these spaces describe what is meaningful in a specific built environment. As many people said, *'our land is everything to us.'*

Concerning, however, is an emerging new elite, schooled in the processes of global development rhetoric. In some cases, it appears that identity based on place and belonging, is in direct conflict with place as a tradeable commodity to create wealth for a few, with little consideration of the rights of their fellow Papua New Guineans to a place of their own.

6.2 CONCLUDING REMARKS

Based on what has been described in this chapter and those preceding, it is clear this study concentrates largely on traditional architecture. Other social, economic, and environmental aspects support the initial aim of understanding what traditional architecture means to the villagers themselves and what they feel is most important for their own housing needs. The advantage of undertaking a case study to address the research question about traditional architecture in the modern urban fabric of PNG is that it adds a contemporary context to the historical, archival information and the process of change over time. It has the benefit of direct observation of the subject being studied and interviews with those who are involved in the events as they unfold.

Although the empirical data was collected from only two case study villages, some of the issues raised relate to the wider ethnography of PNG society, and connections between past traditions and those of the 'modern' world. The underlying premise that villagers live in the context of their traditional relationships is consistent with the objective of this research, to relate the results of the investigation and subsequent analysis to what the villagers themselves expressed to be important and valuable. The material presented here is an attempt to understand, as an outsider, the patterns of change in traditional architecture. The following quantitative data aims to validate the outcomes of the qualitative analysis.

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Chapter 7: Quantitative Analysis

7.0 INTRODUCTION

> *Ultimately all methods of data collection are analysed 'qualitatively,' in so far as the act of analysis is an interpretation, and therefore of necessity a selective rendering, of the 'sense' of the available data (Fielding and Fielding 1986: 12).*

Quantitative data analysis was based on the desire to explore the relationship between groups, to find associations, to summarise descriptive data and to support qualitative analysis. Appendix J outlines the demographic data used for analysis including:

- Tribe/Cultural Lineage
- Gender
- Age Range
- Educational Level
- Employment Status
- Income Level
- Household Structure
- Access to Water/Power/Sanitation

7.1 SURVEY DATA CHECKING AND VALIDATION

In this case the groups investigated were categorised according to villages and regions surveyed in the field. A Contingency Chi-squared ($\chi 2$) test[64] for 2-way tables was applied to test the association of two Categorical (nominal or ordinal with few categories) variables to determine whether there was a significant association between them; in this case education (IV) and traditional materials (DV) and region (IV) and traditional materials (DV).

Cross tabulations reveal the frequency and percentage of responses to questions by various segments or categories of respondents. As this research is about traditional housing, cross tabulation was undertaken to look at several hypotheses related to the original research question: '*What defines traditional architecture in the modern PNG era and how and why has it changed in the places in which it is anchored?*'

[64] The Chi-Square test is most useful when analysing cross tabulations of survey response data, as collected for this research.

- **Hypothesis 1:** There is a relationship between education levels and the use of traditional wall materials.
- **Hypothesis 2:** There is a relationship between the education levels and the use of traditional roof materials.
- **Hypothesis 3:** There is a relationship between the region and the use of traditional wall materials.
- **Hypothesis 4:** There is a relationship between the region and the use of traditional roof materials.
- **Hypothesis 5:** There is a relationship between education levels and villages.
- **Hypothesis 6:** There is a relationship between education levels and power accessibility.

7.1.1 Data Quality and Fine Tuning

As with any data analysis, results are based on the accuracy, reliability and consistency of the data collected. Several problems arose during data checking. The most serious was the variability of the data collected. Osborne (2014) writes about the importance of data cleaning for best practices when using quantitative methods because clean data produces results that are better estimates of population parameters, and are, therefore, more accurate and replicable. He asserts:

> *[…] that data filled with errors and/or which fails to meet assumptions of the analysis being performed is likely to lead to poorer outcomes than data that is free of egregious errors and that meets assumptions (Osborne 2014: 5).*

In some Highlands cases it was clear that the number of respondents exceeded the number of households. In keeping with the original intent of the survey, all respondents who were not heads of households 18 years old or older were excluded, reducing the number of respondents from 390 to 117.

At Tubusereia several respondents said *'yes'* to having mains power, while field observation noted these as illegal connections (via extension cords or other means) and therefore they were included in the *'no power'* category for analysis.

Separate areas were sorted into their main language groups as this also aligned with the specific villages. Kunguma and Gatek were left as separate villages. They are between five and ten kilometres apart and the inhabitants belong to different tribes, even though they are in the same language group and region. However, in some cases, villages were grouped together. For example, Varure is considered a section of Tubusereia, so although some respondents

named it as their village, it has been grouped with Tubusereia, the main village, for statistical analysis.

Regarding income, many people in the Highlands counted themselves as unemployed, because they did not consider subsistence farming, nor any money made from sales at markets, as income. Nevertheless, the declared amount of less than 100 kina per week was verified by key informants as a realistic figure. Another key consideration is that none of the large amounts of money paid for matters like bride price and funerals (*Haus Krai)* are considered income as they are not actually spendable in the Western sense. Thus, people feel uncomfortable about mentioning their monetary holdings and it was deemed to be something that could not be reliably quantified and was therefore not included in the income variable. As will be shown in this chapter however, it can reasonably be deduced that income levels are related to education levels and as such can justifiably be aligned with the hypotheses tested.

Due to the small sample size, materiality of housing was separated into only two categories: traditional and non-traditional. Therefore, for example, woven walls are traditional, while anything else such as timber or fibre-cement sheet was grouped as non-traditional. During interviews, the terms traditional and non-traditional were largely described in this way.

7.2 ANALYSIS OF SURVEY DATA

Hypothesis 1: *There is a relationship between education and the use of traditional wall materials.*

Table 7.1 shows the descriptive results of the relationship between Education and Wall Material variables. As indicated, increased levels of education show an increase in the use of non-traditional wall materials, while the use of traditional materials decreases.

Table 7.1
Education / Wall Material Cross Tabulation

		Wall Material	
		Non-traditional	Traditional
EDUCATION	1 LITTLE OR NO	11.1%	88.9%
	2 PRIMARY SCHOOL	12.1%	87.9%
	3 HIGH SCHOOL	29.6%	70.4%
	4 VOCATIONAL	21.4%	78.6%
	5 TRADE	57.1%	42.9%
	6 UNIVERSITY	60.0%	40.0%

Looking at Table 7.1 we can see low education level is associated with the use of more traditional materials, with more than 88% using traditional materials, whereas the majority of the university-educated respondents used non-traditional materials.

Table 7.2 shows the Chi-square test results and agreement coefficient (Cramer's V). These coefficients are indicators of the relationship between the variables Education and Wall Material. Choice of wall material was significantly related to education level ($\chi 2(5, n=138) = 19.872, p=.001$).

Table 7.2
Chi-Square Tests and Symmetric Measures for the relationship between Education and Wall Material variables

	Value	df	Asymptotic Significance (2 Sided)
Pearson Chi-Square	19.872	5	0.001
	Cramer's V	0.379	0.001

Confidence intervals for the relationship between the use of traditional wall materials and education are shown in *Figure 7.1*.

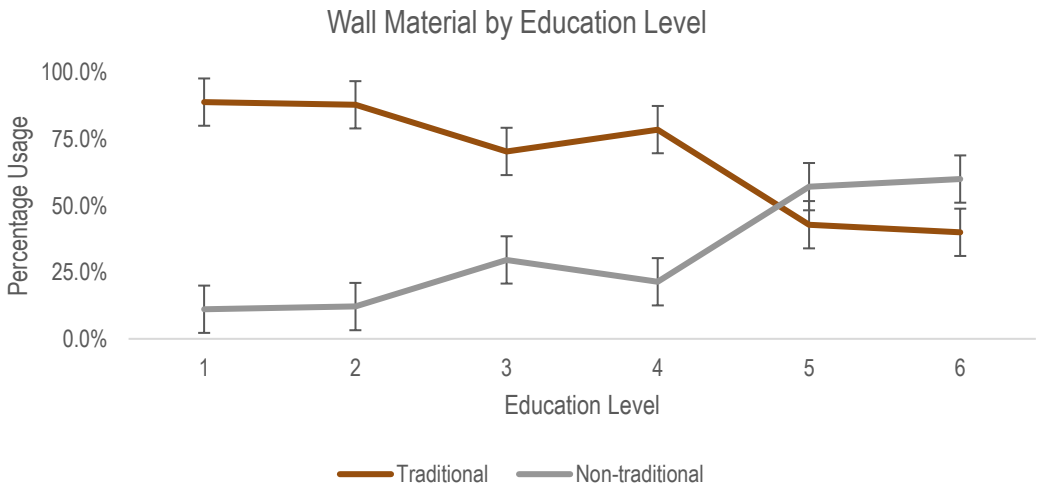

Figure 7.1. Relationship between wall material usage and education.

Hypothesis 2: *There is a relationship between the education and the use of traditional roof materials.*

Table 7.3 shows the descriptive results of the relationship between Education and Roof Material variables. As indicated, increased levels of education show an increase in the use of non-traditional roof materials, while the use of traditional roof materials decreases.

Table 7.3
Education / Roof Material Cross Tabulation

		Roof Material	
		Non-traditional	Traditional
EDUCATION	1 LITTLE OR NO	26.7%	73.3%
	2 PRIMARY SCHOOL	39.4%	60.6%
	3 HIGH SCHOOL	55.6%	44.4%
	4 VOCATIONAL	57.1%	42.9%
	5 TRADE	92.9%	7.1%
	6 UNIVERSITY	100.0%	0.0%

Looking at Table 7.3 we can see low education level was associated with the use of more traditional materials, with more than 73% using traditional materials, whereas the majority of trade and university-educated respondents used non-traditional materials.

Table 7.4 shows the Chi-square test results and agreement coefficient (Cramer's V). These coefficients are indicators of the relationship between the variables Education and Roof Material. Choice of roof material use was significantly related to education level ($\chi 2(5, n=138) = 26.98, p=.000$).

Table 7.4
Chi-Square Tests and Symmetric Measures for the relationship between Education and Roof Material variables

	Value	**Df**	**Asymptotic Significance (2 Sided)**
Pearson Chi-Square	26.98	5	0.000
	Cramer's V	0.442	0.000

Confidence intervals for the relationship between the use of traditional wall materials and education are shown in *Figure 7.2*.

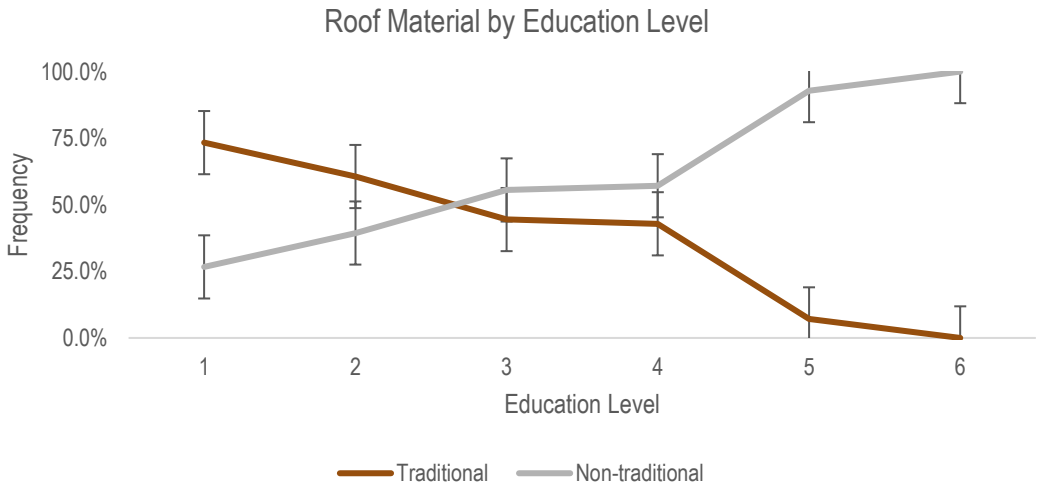

Figure 7.2. Relationship between roof material usage and education.

Hypothesis 3: *There is a relationship between the region and the use of traditional wall materials*.

Table 7.5 shows the descriptive results of the relationship between Region and Wall Material variables. The results indicate that in the Coastal area all participants use non-traditional materials for the walls of their homes, while in the Highlands more than 90% of participants use traditional materials and only 9.3% use non-traditional materials.

Table 7.5
Region / Wall Material Cross Tabulation

		Wall Material	
		Non-traditional	Traditional
REGION	Coastal	100.0%	0.0%
	Highlands	9.3%	90.7%

Table 7.6 shows the Chi-square test results and agreement coefficient (Phi). As these coefficients are related to the Region and Wall Material variables, and the data is 2 x 2, Phi is an appropriate measure of contingency. Choice of wall material use was significantly related to region ($\chi 2(1, n=138) = 80.733, p=.000$).

Table 7.6
Chi-Square Tests and Symmetric Measures for the relationship between Region and Wall Material variables

	Value	df	Asymptotic Significance (2 Sided)
Pearson Chi-Square	80.733	1	0.000
	Phi	0.765	0.000

Confidence intervals for the relationship between the use of traditional wall materials and the region are shown in *Figure 7.3*.

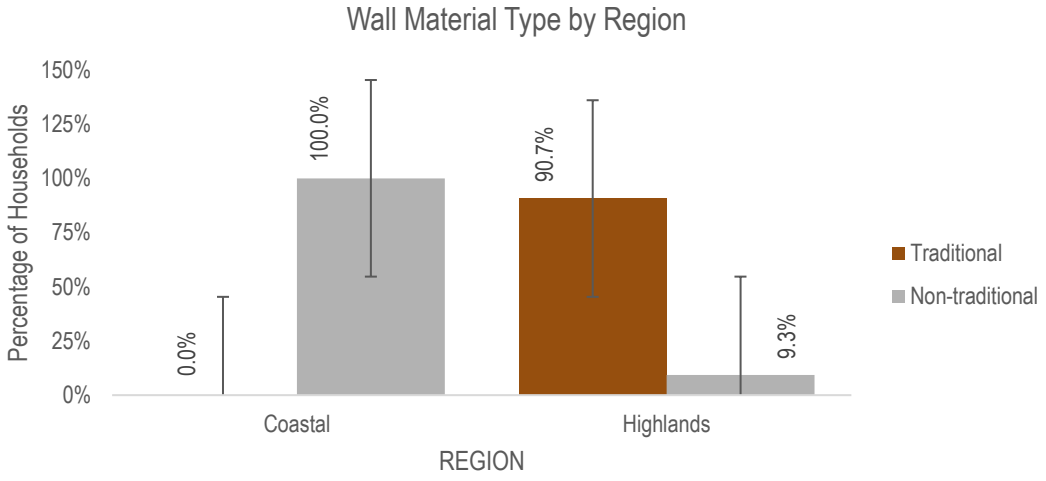

Figure 7.3. Relationship between wall material type and region.

Hypothesis 4: *There is a relationship between the region and the use of traditional roof materials.*

Table 7.7 shows the descriptive results of the relationship between Region and Roof Material variables. As indicated, in the Coastal area all participants use non-traditional materials for roof construction, while in the Highlands 61% of participants use traditional materials and only 39% use non-traditional materials.

Table 7.7
Region / Roof Material Cross Tabulation

		Roof Material	
		Non-traditional	Traditional
REGION	Coastal	100.0%	0%
	Highlands	39.0%	61.0%

Table 7.8 shows the Chi-square test results and agreement coefficient (Phi). As these coefficients are related to the Region and Roof Material variables, and the data is 2 x 2, Phi is an appropriate measure of contingency. Choice of roof material use was significantly related to region ($\chi 2(1, n=138) = 25.516, p=.000$).

Table 7.8
Chi-Square Tests and Symmetric Measures for the relationship between Region and Roof Material variables

	Value	df	Asymptotic Significance (2 Sided)
Pearson Chi-Square	25.516	1	0.000
	Phi	0.430	0.000

Confidence intervals for the relationship between traditional wall materials usage and region are shown in

Figure 7.4.

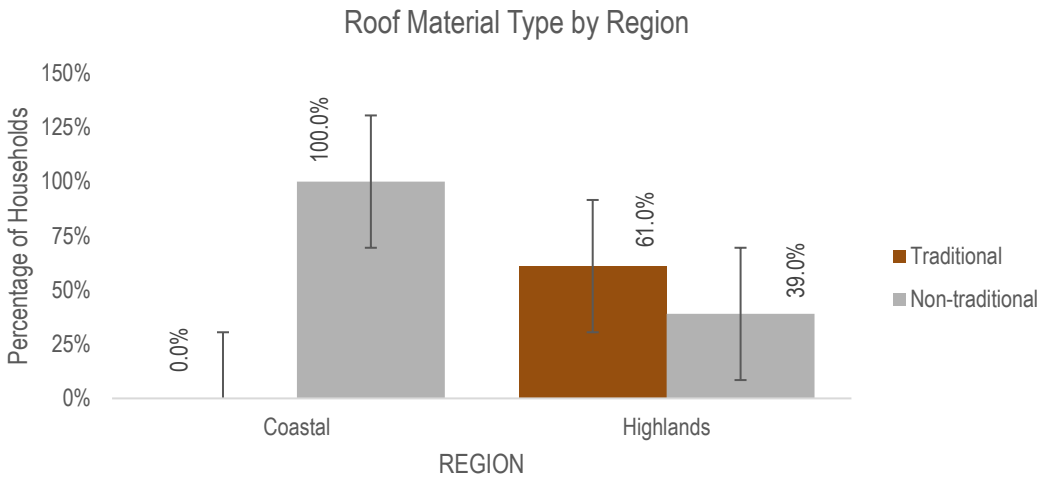

Figure 7.4. Relationship between roof material type and region

Hypothesis 5: *There is a relationship between education levels and villages.*

Table 7.9 shows the descriptive results of the relationship between Education and Village variables. As indicated, the level of education of the participants differs in different villages.

Table 7.9
Education / Village Cross Tabulation

EDUCATION	**VILLAGE**				
	Gatek	Kunguma	Tubusereia	Varure	Other
LITTLE OR NO	42.2%	42.2%	0%	0%	15.6%
PRIMARY SCHOOL	54.5%	33.3%	3.0%	6.1%	3.0%
HIGH SCHOOL	33.3%	37.0%	7.4%	18.5%	3.7%
VOCATIONAL	35.7%	35.7%	0%	7.1%	21.4%
TRADE	21.4%	35.7%	28.6%	7.1%	7.1%
UNIVERSITY	0%	40.0%	40.0%	20.0%	0.0%

Looking at Table 7.9 we can see that low education level is associated with respondents living in Highlands villages (Kunguma and Gatek), with more than 42% having little or no education, whereas in the more urban Tubusereia sample the majority of respondents were trade or university educated.

Table 7.10 shows the Chi-square test results and agreement coefficient (Cramer's V). These coefficients are indicators of the relationship between Education and Village variables and confirm that levels of education vary significantly between different villages. The Village variable was significantly related to education level ($\chi 2(20, n=138) = 45.481, p=.001$).

Table 7.10
Chi-Square Tests and Symmetric Measures for the relationship between Education and Village variables

	Value	df	Asymptotic Significance (2 Sided)
Pearson Chi-Square	45.481	20	0.001
	Cramer's V	0.287	0.001

Hypothesis 6: There is a relationship between education levels and electric power accessibility.Table 7.11 shows the descriptive results of the relationship between Education and Power variables. As indicated, an increase in respondents' levels of education resulted in an increase in their access to electric mains power.

Table 7.11
Education / Power Cross Tabulation

EDUCATION	POWER		
	None	Power	Solar
1 LITTLE OR NO	55.6%	20.0%	24.4%
2 PRIMARY SCHOOL	33.3%	21.2%	45.5%
3 HIGH SCHOOL	37.0%	37.0%	25.9%
4 VOCATIONAL	35.7%	50.0%	14.3%
5 TRADE	14.3%	64.3%	21.4%
6 UNIVERSITY	0%	100.0%	0%

Looking at Table 7.11 we can see that lower education levels are associated with Power variable. More than 55% have little or no education and no power, whereas in the university and trade educated sample most respondents had access to power. These results confirm that an increase in the use of mains power is significantly related to the level of education.

Table 7.12 shows that Power variable was significantly related to Education (χ2(00, n=138) = 29.701, p=.001).

Table 7.12
Chi-Square Tests and Symmetric Measures for the relationship between Education and Power variables

	Value	Df	Asymptotic Significance (2 Sided)
Pearson Chi-Square	29.701	10	0.001
	Cramer's V	0.328	0.001

The relationship between power access and education is shown in *Figure 7.5*.

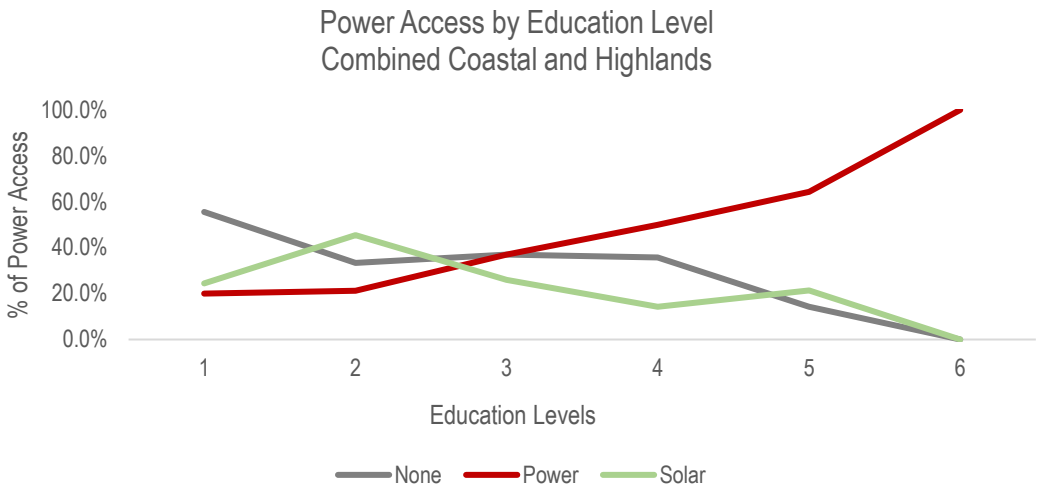

Figure 7.5. Relationship between power access and education.

Surprisingly, in the absence of access to mains power, and uptake of solar power was found in respondents with lower education levels. However, the uptake of solar power for those with the highest education levels is minimal.

These findings regarding solar power present an exception to the pattern of predictable outcomes for power access. The available statistics for the total population show that 59.2% of the PNG urban population use mains electricity for lighting, while only 15.7% use solar. Conversely, of the rural population, 11.4% use mains electricity while 35.3% use solar. (National Statistical Office Papua New Guinea 2017b; National Statistical Office Papua New Guinea and ICF 2019: 20).

Comparing the results of the PNG Demographic and Health Survey of 2016-18 in relation to education levels for the two provinces shown here, Central Province has 27% with little or no education while WHP have 32.4%. In Central Province 6.7% completed some secondary school while in WHP the percentage is 8.6% (National Statistical Office Papua New Guinea and ICF 2019: 28).

The reason to consider these two categories of education is that they correlate with the educational levels of the village leaders in each of the two groups surveyed for this research - Tubusereia and Kunguma/Gatek. In Tubusereia, the village leader had some secondary education and was also furthering his education at a Tertiary level. On the other hand, the Kunguma leader had little or no education and while the Gatek leader had some secondary school education up to Year 10.

While there is insufficient data to form conclusions about why higher educational levels should affect the uptake of solar power for lighting, observation and informal discussions indicate that many of the more educated respondents at Tubusereia are government employees at management level who have public housing provided in Port Moresby and only live in the village on weekends, thus this research proposes there is no critical driver for the uptake of solar within this group.

At Kunguma and Gatek there is no such provision and decisions are still made according to the influence that a strong leader can exert. For these respondents, who made up the bulk of the solar power users, the purchase of solar panels was self-funded, encouraged by the Gatek Councillor who bought one small panel as a trial. The visible success of the intended benefit of providing lighting to enable their children to do homework, encouraged the remaining respondents, who also made individual choices to start with one panel. As with many such purchases, each family will produce extra to sell at the markets until they have enough money saved for their desired purchases.

Discussions during post-interview reviews at Kunguma revealed that although the Councillors are supposed to receive some funding through the Provincial Government to support regional development initiatives and to reduce the perceived inequity between rural and urban development, none had been received by any Councillors between 2012 and the time of writing.

Table 7.13
Councillors funding – Highlands Case Study.

Respondent	Transcript
IDI-FK-H-01	They have to do things on their own. Peter has to use his own resources. His wives work or his kids grow food crop or pigs or whatever it is, and he uses that for development in his area. It's really sad.
IDI-MR-H-01	and the funding he is supposed to receive from the Provincial Government he hasn't seen since he's been a Councillor. There is a dead set stated allocation that should come through from the second tier of Government that he hasn't received … ever!
IDI-FK-H-01	And you see those kinds of things. People in the village, they know about … but they don't know … they should be jumping up and down about it and causing … some kind of … I don't know … protest or whatever. And so, the Government gets away with it.
IDI-MR-H-08	It's pretty much like the fish rots from the head and if you get leadership from the top it will funnel down and would improve … and that's the real issue.

7.3 COMPARISON OF QUANTITATIVE SURVEY FINDINGS: TWO FIELD SITES

When comparing the two regions, anecdotal evidence suggests that the further away from Port Moresby, and possibly the later the colonial contact, the more traditional the housing. It is not clear statistically whether this is to do with remoteness, inaccessibility, income, or government apathy in relation to rural areas.

Participants progressing to high school or university have lived away from their villages to do so and, therefore, have had more exposure to urban facilities. The data suggest that those with a better level of education are more inclined to have better facilities such as power, regardless of whether their homes are traditional or non-traditional. Of the 138 participants surveyed almost 70% earn less than 100 kina per week, with 56% of the sample not having progressed beyond primary school, and a further 20% not beyond high school.

The data indicate a connection between income and education which can explain some trends related to the use of traditional or non-traditional materials and better access to power. Those with higher education levels also have higher income, as indicated in *Figure 7.6*. Sankey Diagrams are useful for converting proportion to flow to compare, contrast and show connections, whereby the thickness of the line indicates the quantity and the direction in which that quantity is apportioned.

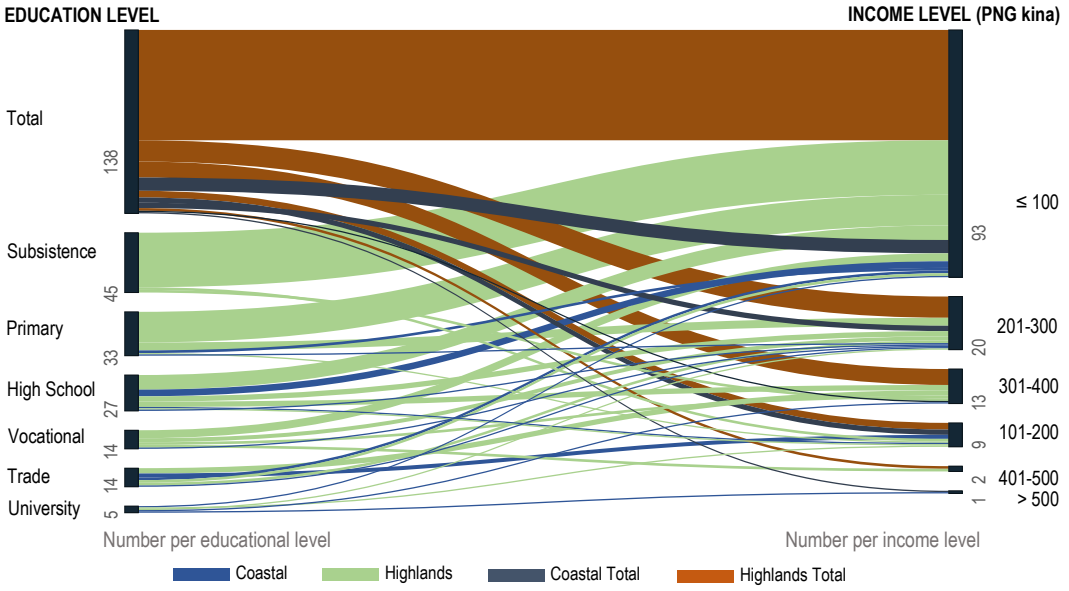

Figure 7.6. Relationship between income levels and education levels.
By author (fieldwork data processed using online Sankey Diagram Generator by Denes Csala utilising the d3.js plugin (http://sankey-diagram-generator.acquireprocure.com/).

Moreover, when considering the relationship between access to power and participants' education levels, decisions are often influenced by the village councillor's age and education level. Without access to mains power, at Gatek, for example, the uptake of solar power as an alternative is very high (approximately 69%), while at Kunguma it is only about 4%. During team review sessions, key informants suggested that the difference in uptake of solar power between Kunguma and Gatek is strongly influenced by the education levels of the village councillors.

The Gatek councillor is in his late forties, is educated to Year 10 and is a good orator and negotiator, both within and outside the village, but continues to live a largely subsistence lifestyle. The main reason for the uptake of solar power was said to be for lighting to enable children to do their homework in the evenings. This is because, in the opinion of the councillor, children's education is considered an important factor in moving forward as a nation.

The Kunguma councillor is in his 60s and had a rudimentary education at mission school during the colonial administration. He also continues to live a largely subsistence lifestyle, and although a very well-respected big-man and fine orator within the village setting, has fewer negotiating skills outside the village. However, Kunguma has slightly better road access and has some mains power for those houses closest to the Kuta school and church.

From the data shown in *Figure 7.6* it can therefore be reasonably deduced that the significant relationship between the use of traditional building materials and education (Hypothesis 1 and 2) is also connected to both income and region, and significantly affects the choice of housing.

In terms of residential buildings, the data suggest that at Kunguma there is a dominance of traditional housing consistent with income at subsistence levels related to lower education levels, while at Tubusereia transition to modern housing is the norm (

Figure 7.7 and

Figure 7.8). As the analysis shows, the reason for the difference is a complex interweaving of social, economic, and environmental factors.

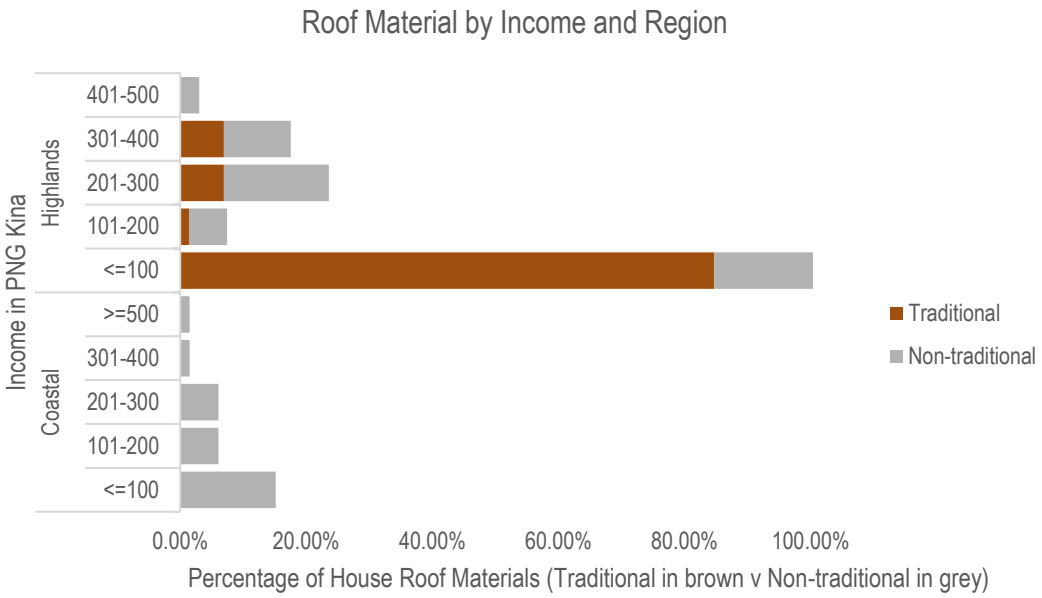

Figure 7.7. Roof material by income and region.

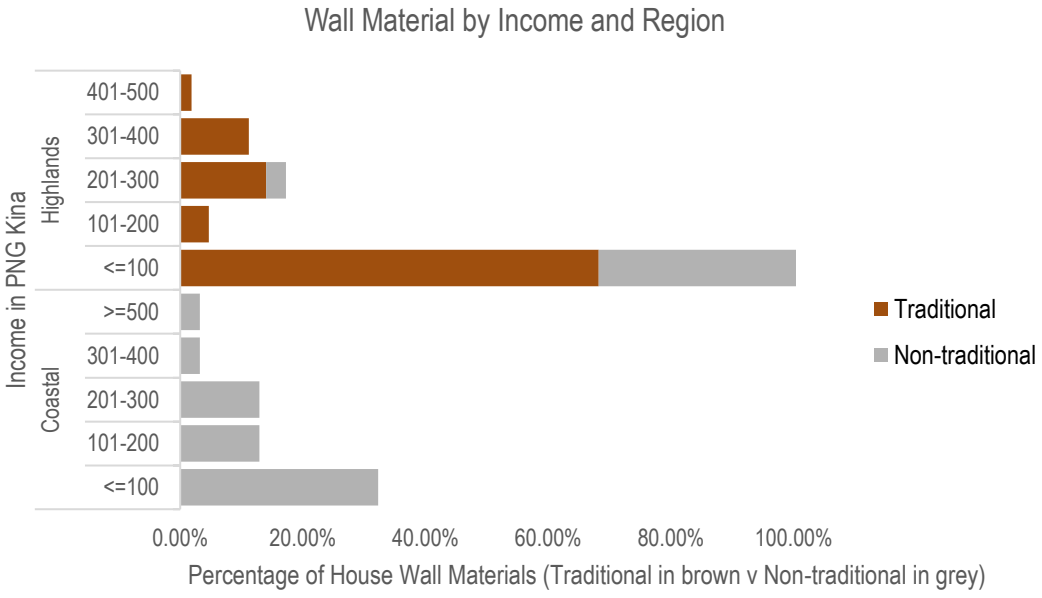

Figure 7.8. Wall material by income and region.

7.4 CONCLUDING REMARKS

> *The concept of 'Melanesia', and 'the Melanesian way of doing things', is an enduring rallying- call in today's national and regional politics. However it is deployed (passionately or cynically, as verbal habit or as re-discovery), it is its connotations that are of interest. What it embraces is patently not reducible to particular nation-states, let alone a specific society or culture; rather, Melanesia exists in the recognition of social-cultural affinities that link peoples or collectivities, wherever they are localised, across the many islands. The point is that those who refer to the Melanesian Way include themselves in the idea that these peoples are in some kind of relation with one another (Strathern 2019: 562).*

Using multiple sources of evidence which converge on the same facts or findings helps develop pattern matching, explanation building and cross-case synthesis. Statistical data, as drawn upon here for the two embedded units of case-study analysis, can also strengthen the overall analysis by linking the purpose of the research to the type of statistical analysis used.

The rationale for quantitative data analysis for this research was based on the theories of Gliner, Morgan and Leech (2016: 335), whereby the general purpose of exploring relationships between variables can be combined with descriptive analysis to find associations and make predictions. Using the combination of inferential and descriptive statistics demonstrated in this chapter, will enable linking the questions asked with the conclusions drawn in the following cross-case analysis.

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Chapter 8: Comparative Cross-Case Analysis

8.0 INTRODUCTION

This chapter compares the findings of the villages selected as cases for this research and outlines the similarities and differences with a view to synthesising the results.

During the first research field trip in 2016, while documenting the construction of a *Haus Man* it became clear that traditional materials took precedence mainly due to their ready availability and familiarity. However, materials perceived as more technologically advanced, or that represent higher status, were readily adopted. For example, when Loupis (1984) documented Highlands architecture, houses were similar to those observed at Kunguma in 2016. Nevertheless, plastic sheeting has replaced bark lining and nails are often used in lieu of vines. Fourteen years after the Loupis study, ceremonial housing in the Western Highlands Upper Jimi District was documented by Milani (1998). As previously noted, traditional materials were used. Symbolically, this was perceived as an important aspect of a properly constructed ceremonial building. Discussions during field work regarding a new building on the *singsing* grounds at Kunguma suggested a further iteration. The building would be raised on stumps rather than set on the ground and would have *kapa* (metal) walls and roof, both being considered more modern and prestigious.

Abandonment of ceremonial houses was not unique to the Highlands or the southern coast. In the Sepik area, for example, Telban (2018b) notes the transition away from the symbolic aspects of men's houses began as early as 1994.

> *Following the arrival of the Catholic charismatic movement in December 1994 the last men's houses in Ambonwari village were slowly abandoned as were the carved spirits hidden in them (Telban 2018b: 4).*

There was also no evidence of the ceremonial structures observed at Tubusereia during fieldwork, although traditionally the Motu did not construct grand ceremonial buildings such as those in other regions like the Sepik, Highlands or Gulf (Williams 1924; Bateson 1958; Loupis 1983; Hauser-Schaublin 2015).

As noted by (Oliver 1997: 1172), although men and women usually lived in separate residences at the beginning of the 20th Century, by the 1970s, for a variety of reasons people

were moving away from their villages and were living in towns as couples. In urban areas migrants tended to settle in their tribal groups and in many cases preserved the forms of their buildings to suit their traditional lifestyles, while modifying the materials (Norwood 1979; Umezaki and Ohtsuka 2003; Doran 2006; Jones 2012b; Connell 2015).

The evidence presented in this research supports the proposition raised by Jones (2012c) that squatter settlements (generally the illegal occupation of state land) and informal settlements (arrangements negotiated with customary landowners) are indistinguishable spatially from traditional villages, and that they have become the dominant urban form emerging as village cities in PNG. Although the study relates to the wider ethnography of PNG society, the foundation of the research outcomes is limited to discourse from the villages of Kunguma and Tubusereia. This research has also confirmed that the term 'village' was a term of convenience for colonial administration, and covers a wide variety of habitats, not all of which can be described as adhering to the imagery of egalitarianism and communalism (Goddard 2017).

Urban settlements on the fringes of, and enveloped by, cities like Port Moresby and Lae developed organically into ethnic enclaves, retaining many characteristics of their rural villages of origin. Nevertheless, through a process of natural change, as Telban (2019) suggested, rural migrants to towns, and those who were born there, developed their own practices of placemaking, social organisation and sense of belonging. Any generalisations made should be considered within the limitations of this research as approximations of the norms and values of the two field areas of Kunguma and Tubusereia. The aim is to achieve a general understanding of the process of housing transformation in PNG, a goal which can only partially be illustrated by the individual case studies.

Identifying and analysing changes in housing typologies in villages, and recognising patterns of existing and emerging house types, provides an opportunity to see how housing transformation takes place, and the drivers and implications for urbanisation in contemporary PNG. In this context, and more evident in Tubusereia, the transformation of urban villages into village cities has resulted in a blending of traditional and modern ways, partly due to the desire for basic water, power, and sanitation infrastructure provision, but also because *tradition* is capricious. Although there is a desire by the older generation to make sure that tradition is maintained, at the same time, it is not seen as static, but able to combine the old ways with new innovations; '*Yes! Combining both!'* (IDI-MV-H-04).

At a fundamental level this is in keeping with Shils (1971: 124) who contends that the linking of historical aspects of a society, transmitted via a sequential temporal pattern, is tradition. In this way, the past is part of the present. Considering the temporal aspects allows for small incremental modifications, to the extent that they are not seen as significantly different from traditional ways. This was evident for example at Kunguma where woven walls are seen as traditional because they have become the norm during the living memory of the people concerned, however, as discussions during participation in the construction revealed, older villagers recall a time 50 years before, when bark was the norm.

Contemporary settlements represent a wide range of cultures and traditional values. In the PNG setting, culture is used to integrate individuals and affirm groups' social identity, while at the same time creating different habitats that separate them from other groups. Habitat selection for rural villagers when migrating to the city has been largely based on group values and notions of identity, despite the changing nature of town-village society.

Much literature supports the notion of regionally segregated village-like settlements in a spatial sense around larger cities like Port Moresby and Lae (Hitchcock and Oram 1967; Strathern 1975; Norwood 1979; Jones 2012c). However Goddard (2017: 26) for example, notes (and this research supports), that since the turn of the century there has been gradual erosion of regional insularity and idealised village values.

Nonetheless, improvements in living conditions in informal settlements can benefit from the village-cities concept to understand what people build for themselves in terms of homes and habitat and therefore, support an improvement in perceived desirable living conditions. In this sense, what people in villages themselves feel to be important and valuable, the focus of this research, provides an additional layer of understanding to the discourse on housing access.

8.1 POLITICS OF SPACE AND EVERYDAY SPATIAL PRACTICES

Housing in PNG is part of a total spatial and social system. The norms and values of villages and settlements dictate the use and form of the housing in the vacuum produced by the absence of any real planning regulations or government financial commitment. The reality is that no meaningful rights to affordable shelter have been part of the policy on housing in PNG. Social housing provision has thus far been limited to public service, police and armed services housing which is overpriced and culturally unsatisfactory, leading many to continue living in villages and settlements. Under the United Nations Convention, affordable shelter is a basic

human right that is, according to Mungu (2014); Tanim Graun (2014) not yet available to most Papua New Guineans. However, these notions of living conditions and affordability appear to be based on a stereotypical assessment of aid or government-provided social housing model, rather than what people are providing, and perhaps prefer, to build for themselves.

People know, both individually and collectively, that in the short term little or no provision will come from the government. The *wantok* system, which often stymies government and business by encouraging nepotism and corruption (Seniela, Babarinde and Holis 2019), conversely provides tacit understanding regarding house and land acquisition through tribal and social networks. Shared knowledge and community collaboration, as practised in villages, is transposed onto urban settlements, and is adapted to suit specific cultural needs.

8.1.1 Polygamous Family Living Patterns

In the context of PNG, the complexity of what constitutes a household further complicates the notion of a single solution for appropriate housing. There are, for instance, cases of *polygamous families* with wives either co-habiting or living in their own houses, cases of extended families where three generations share the same space, households which fit more with the concept of the nuclear family, or alternatively, a combination of any of the above. Thus, the outcomes of housing transformations reflect changes in circumstances, in most instances initiated by the owner's needs, desires, and economic security.

One participant from the Highlands, for example, has four wives. His first marriage was an arranged one using traditional bride price payment. However, his first wife has returned to her own village and has no interest in living with her husband's clan. His second wife had a daughter from a previous marriage and therefore no bride price was paid, but the daughter was brought up by the participant from a young age and has her own house within the family complex, to which she can return when she finishes her nursing traineeship, should she wish to do so. Her mother lives in her birth village while the daughter is studying, as it is close to the main town of Madang, however she also has a house within her husband's family complex. The third wife resides with her husband and carries the major responsibility for running the household. She encouraged her husband to marry again to help with the workload that is needed to support his responsibilities as a leader of the village.

The fourth wife lives and works in Mt Hagen while her house in the village is under construction. It is unlikely that she will spend much time in the village. Nevertheless, as she is expected to help by contributing financially to the household, she will be provided with her own

house. Although traditional in size and form, this house has a concrete floor, sheet metal walls and roof, as well as windows, befitting her status as a better educated financial contributor. Each of these houses has its own *haus kuk*, but often these are shared, depending on what facilities are best for specific social occasions or the number of family members residing at the complex at any one time. Questions at Kunguma about the reasons for having more than one wife elicited a response that there are many different reasons, but generally they are economic, and often at the instigation of the first wife.

Table 8.1
Social Benefit of Co-wives: Highlands case study

Respondent	Transcript
IDI-MR-H-08	When we were having dinner with IDI-MM-H-04 and [his wife], she seemed to be very influential; he was very ... like a few times made reference to how important ... like she keeps the household running and ticking over, money coming in ... that was a refreshing thing to hear and see. Like the respect he had for her.
IDI-FK-H-01	I've said it before ... people always say oh the inequality ... and as soon as we get women equal and on par and all of that stuff it'll be better but I really think that we have to make the men feel worthy and complete and whole in order for them to allow their women to step up. So, IDI-MM-H-04 is secure in his manhood and as a man so therefore he allows his wife to have that influence at home. He'll still take the lead. He'll be the speaker and in front and all that but he's not going to disregard what his wives are doing. Because she's probably like he said ... she's the one that keeps the household running, she knows what's happening in the gardens and all of that kind of stuff. Like with IDI-MM-H-04 and his wives too, it would be interesting if you knew which wife did what. Like I think he's so organised that one of his wives is more inclined to do the gardening, one is more inclined to do the finances, that sort of thing. And for a man to be able to have four wives and for none of his wives to be fighting each other or wanting to murder each other that speaks to him as a man and how he's able to do that.

A field sketch indicating the layout of the family compound above, and notes regarding access to the site are shown in *Figure 8.1*. Access to the site, like many in the area, is by foot, crossing the river on a narrow (in 2016) single log bridge. The field journal author was hesitant about the crossing; the fall to the boulders and stream below was about 3 metres.

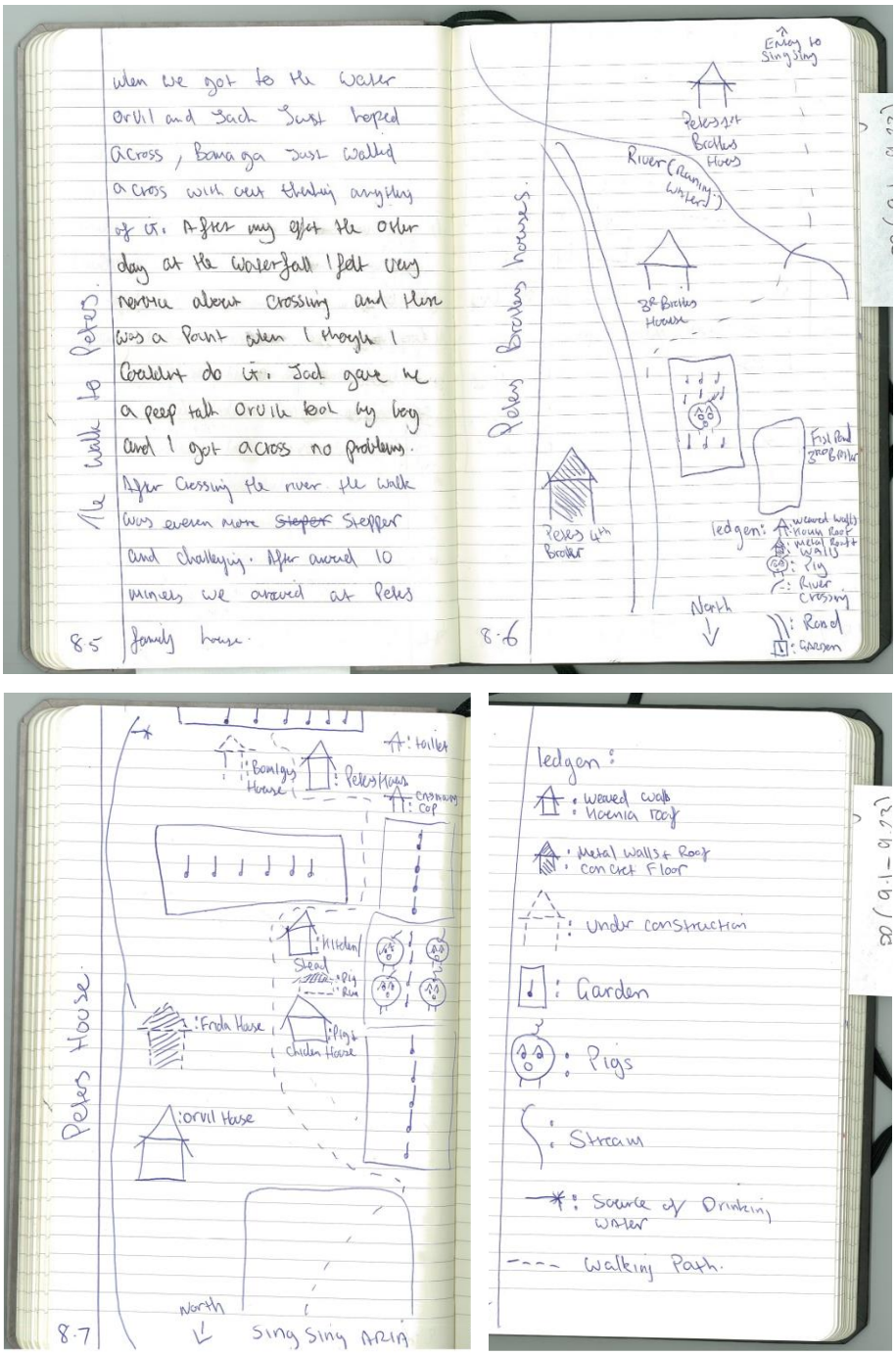

Figure 8.1. Family Compound showing co-wives houses.
With permission: Paul Bowell (JCU field researcher 2016).

When this author returned in 2017, the bridge had been upgraded to two logs but was nonetheless still daunting to cross without assistance. The villagers themselves, cross with aplomb, showing none of the concern for life or limb experienced by visitors.

Figure 8.2. Crossing the bridge to Gatek with Councillor Peter Raim.
By author September 2017.

Discussions from team review show one of the many societal reasons why standardised housing cannot provide for the wide range of circumstances prevalent in PNG. The practice of taking co-wives is not uncommon in the Highlands, even among the more educated members of the community, but it does not always have positive outcomes.

Table 8.2
The Wicked Problem of Co-wives: Highlands case study (a)

Respondent	Transcript
IDI-FR-H-05	One of the women had a co-wife. She was from a different tribe - one that had some bad history. Someone from their tribe tried to poison someone from this tribe so they had that history for quite a while.
IDI-FK-H-01	I think it was that the husband had a boyfriend-girlfriend arrangement with the other woman beforehand and then she went off to school somewhere and in between times he had a relationship with the first woman but because this ... the other lady ... was at college or whatever, the people in the village thought that she would be the better wife because she was educated. She would be an asset to the community and the village. But I always think, how many western relationships would survive that where the man goes and does what he wants to do and she's busy rearing the children and getting the garden and the house and yet ... see you when I see you.

In the case (a) above, the outcome almost ended in the death of one co-wife. Previous studies in the Highland confirm that polygamous family life had its ups and downs. During his

work in what was then the Central Highlands northeast of Mt Hagen, Clarke (1971: 29-30) noted that every wife had her own house, with husbands making conjugal visits. He contends that co-wives were not necessarily expected to cooperate with each other because the unit is largely an economic one. Feuds appeared to be unusual; generally, the result of one co-wife being aggressive and dominant in asserting her primacy, as noted for case (b).

Table 8.3
The Wicked Problem of Co-wives: Highlands case study (b)

Respondent	Transcript
IDI-MR-H-08	I was just wondering; like how does the sleeping arrangement work? I know that's pretty personal but ... We couldn't work it out because we don't think they slept ... there were four bedrooms ... we think that they slept in different bedrooms, but we went to bed earlier. But they're also building separate houses for them ...
IDI-FR-H-11	What actually I found ... um and I sort of asked around and they generally don't sleep in the same house so usually the husband will sleep with the first wife in the main house and the second or third wives will have a second house close by that they live in with their children and he'll sort of split his time wherever he feels like sleeping that night.
	Anita's mother is first wife and she has a co-wife … and they seem ... they get on well now, but the first thing she said when she introduced herself and her co-wife was oh, we used to fight all the time ... I think also because she was only about fifteen or sixteen when she got married so there was an older woman who had already had her children and then her husband was marrying someone fifteen years younger.
IDI-FK-H-01	So, who do you think made the decision about getting a co-wife?
IDI-FR-H-11	Well, she said it was her husband. But no? It was her? Wow ... oh my God ... that's not what they said. Seriously?
IDI-FK-H-01	She didn't decide that she needed a co-wife; they discussed it. He would not have gone and got a second wife without her permission ... So, they talked about it and she said yes let's do it and she hated it and then she made [the co-wife's] life miserable.

Although other studies have suggested that aggression towards co-wives was the norm, see for example (Read 1954: 23), the evidence from this research is more in keeping with Clarke (1971); it is subject to individual personalities and behaviours.

In both study areas the transition from tradition to modern was observed to be an incremental process. Building materials are obtained as funds become available, often spanning several years. This leads to an eclectic mix of innovative design solutions for the short, medium and long terms that can easily accommodate the shifting needs of dynamic families. Lack of basic services in both communities means that individuals have become resourceful in meeting their own needs and are surprisingly resistant to interference from the inhibiting effects of Government control in terms of housing choices. There is little trust in the Government but an

appreciation of the need to pull together as a community, particularly in the Highlands study area where a subsistence lifestyle is prevalent.

Table 8.4
The Politics of Housing: Highlands Case Study

Respondent	Transcript
IDI-MM-H-14	I would say that [our Kunguma ancestors] were the caring and sharing government, yeah. And then later came the Europeans. They brought in ... more of a socialism but no it was ... almost like communism. And after that they had democracy coming in, so we had a mixture of communism and democratic ... and then to top it off we had the capitalism government ... from the Queen you know and the Commonwealth countries and all that so ... from that we had a really good way of living ... caring and sharing. I think that was the best and we still have that ... no payment; no payment, you just go up and help somebody; they come and help you. So, we help each other. Caring means we care for others. If somebody is building a house, we help build. If somebody is doing a garden, we help make their gardens. And it's all in a rotate thing you know like ... when I need to make a garden everybody else come and help me and when I need to do something everybody else is at my back. They're not my friends but the village you know. So ... it's a thing that I am really interested in what our ancestors lived. I think they lived in a very good way. Even though they had problems, they had trouble, but they're turning out good ... not like in modern countries like Europe and Israel. There's war forever ... how people they use war to solve things? I think that if the government was run in our own Melanesian way it would be a good government. But I am angry with the government today ... a lot of people think that. There's a lot of things they [the government] don't understand but they don't realise that what they're doing doesn't work. It's a thing that they always maintain about things that they don't do but they don't mention things that they've already done. There's a lot of things happening in cities and in towns here in New Guinea but normally we never feel the effects. We're alright you know. We're natural; we're OK. We have our own land, we've got the food and everything, so we don't really ... those effects don't affect people in the village ... things only happen in cities and towns.

For the Coastal study area, the notion of Government support or action is similarly derided. As with all housing on customary land, there is limited provision from Government for any water or sewerage infrastructure, with token assistance offered in exchange for votes.

Table 8.5
The Politics of Housing: Coastal Case Study

Respondent	Transcript
IDI-MV-C-02	Sure, but times are changing. The town (Port Moresby) was really far, but we can see the town from here now. It's just that close. And we've got a new road coming. People will be going in and out of this place. Sometimes they go to town three times during one day. Because buses will be running up and down. We want to change this village [Tubusereia] into … I'm just hoping that someday we will change this place into a town. To have its own rubbish collection system, sanitation …
IDI-MV-C-01	I've lived here since I was born in 1945, except when I was travelling around for work. I built this house myself with some help from my former employer. He let me use the grader for earthworks [for excavating the small hill]. Sometimes during elections, we get offered a bag of cement or something small like that … in exchange for votes. But if our man doesn't get in … nothing (laughing)!

As the above conversations indicate, regardless of whether in a more remote village in the Highlands, or the Coastal urban village context, people are realistic about measures that they can expect from the political process and accept that reliance on government intervention for basic services is futile. Without doubt, observation during field work showed that at Tubusereia, rubbish and sanitation have become an almost insurmountable problem and one that is more pressing than the physical appearance, spatial arrangement, affordability, or social inequity of housing provision.

8.2 CHANGE AND REGENERATION

A common occurrence in both communities is the participation of extended family and villagers in house building, if not physically, then providing food or mobilising the workforce. As part of the cycle of exchange this builds on relationships between community members, while also imparting knowledge to the younger generation through example. Even if a builder is involved, as is the case for most homes at Tubusereia, deciding where the house is to be built, how it is to be funded, and who should be involved, is a consultative process.

The effects of colonialism, road access and educational opportunities have led to the diffusion of new ideas. As this research shows, most people are willing to change and are receptive to innovation, despite the sadness associated with leaving the familiar behind.

Moreover, with ready access to social media and the necessity of leaving the villages for higher education, there is an awareness even among the older generation that the world is constantly changing, and they must change with it.

Consequently, the assumption of status through ownership of more modern housing is balanced by the evident and improved usefulness of certain elements. Some materials, such as sheet metal roofing and fibre-cement cladding, are longer lasting as well as easily transported and erected. People at both Kunguma and Tubusereia are also cognisant of global issues regarding environmental degradation and climate change; while status is an important aspect in the cultural fabric of villages, nevertheless there is a strong recognition that with status comes responsibility for ensuring that a good life remains possible for future generations.

Economic feasibility is one of the main reasons for continuing to build with traditional materials at Kunguma, although pride and self-reliance are also key drivers. In both villages, while materiality may be changing, either because local materials are not available or because

traditional skills are lost, the cultural compatibility of housing is evident in the way that it provides for the social, psychological and technological aspects of life.

Nevertheless, the long term effects of building on land in the coastal areas have resulted in erosion, depletion of the mangrove ecosystem and severe planning problems, such as access to fresh water and inadequate waste management (Daroa 2016). These things are not new. Numerous reports have been produced by the United Nations, various NGO's, NRI and a host of researchers and government advisors, lending weight to the proposition that there is a need for a more synthesised approach to housing that draws on village principles while recognising that village inhabitants, whether rural or urban, diverse or uniform, are integrated into social, political and economic systems in a state of constant flux.

8.3 BUILDING FOR THE FUTURE: WEAVING THREADS FROM THE PAST

The study of vernacular architecture, is important because it can show the effects of different forces on the development and character of built form (Rapoport 1969: 46), the fundamental requirement being the provision of shelter that is suited to environmental, economic and social needs of the population. The intimate relationship between society and its physical environment in traditional settlements is self-evident but it is no less significant than the situatedness of buildings, the resources and technological methods used in their construction, and their ability to meet the requirements of comfort and functional use. These considerations are fundamentally interdependent and are all related to the total structure of the society (Abu-Ghazzeh 1997: 246).

In PNG however, where much of the traditional built environment was ephemeral (in a material sense), the study of traditional housing in villages is one way of capturing remnants of the past. If the past does indeed influence the present, as this research proposes, then PNG could develop a vibrant, varied, socially and ecologically responsive housing model that fulfils the ongoing needs and aspirations of its people, whether they choose to remain in a village environment, on customary land, informal settlements or the city proper.

8.4 CONCLUDING REMARKS

As discussed in Chapter 4, the data collected from in-depth interviews and focus groups were used to answer the main research question: W*hat defines traditional architecture in the modern PNG era and how and why has it changed in the places in which it is anchored?*

This chapter presents the empirical analysis, results and findings of what constitutes traditional architecture in PNG from the perception of participants. Analysing changes in housing typologies in villages addressed the objective of recognising patterns of existing and emerging house types. Face-to-face surveys identified the number of houses that were considered traditional and those thought of as modern, including peoples' perceptions about what those terms meant, while aerial mapping provided a graphical understanding of the data and clarified spatial layouts and patterns between urban settlements and villages.

To understand people's concept of housing modernisation, the results of informal semi-structured interviews allowed analysis of development currently taking place in rural and urban villages. The driving factors for the continuation or abandonment of traditional building are also discussed with reference to the literature reviewed in Chapter 2. In keeping with the original research design, interview and focus group perceptions were scaffolded with demographic data that was analysed separately. Both qualitative and quantitative analysis were synthesised to provide interpretation of the results.

The following chapter presents general conclusions for this thesis in relation to the research question, aims and objectives. It provides insight into the implications derived from the findings, limitations of the research and recommendations for further relevant research, to add to the body of knowledge regarding housing in villages and village cities.

Chapter 9: Conclusions

9.0 INTRODUCTION

> *Buildings are transmitters of life. They transmit the lives of the past into the lives of the future – if they are more than mere shelter and more than borrowed form (Moholy-Nagy 1957: 19)*

In the foregoing chapters a general overview of the research project, its theoretical basis, implementation, analysis and findings were described. This chapter summarises the main findings of the research questions and objectives and outlines the research contribution to cross-cultural vernacular architecture studies in PNG. It focuses on the main research agenda which is to develop a deeper understanding of the physical and social qualities of past and recent house traditions, and the contribution this makes to alleviating critical urban housing shortages in PNG. General conclusions and recommendations for future research are then presented.

9.1 SUMMARY OF THE RESEARCH

This research was conducted with the aim of understanding how housing transformation takes place. Interpretation of the built environment through the lens of history identified changes over time and confirmed the notion that the past does indeed influence the present (Rapoport 1969; Clarke 1990; Hope and Haberle 2005). It also provides a way to determine how people respond to the future. An overview of pre-colonial house architectures in PNG was significant for historical underpinning, to help explain conditions that lead to architectural transformations. However, what has also become evident is that there is a propensity to stigmatise self-help housing and yet romanticise traditional ways that no longer meet the needs and desires of the people themselves.

As shelter is one of the most basic human needs, this study looked at housing typology in two different PNG loci (Kunguma and Tubusereia villages), to identify patterns of existing and emerging house types. The combination of field observation, images and demographic data provided the means to identify and analyse change. Patterns emerged, showing that housing in the two different regions were divergent by comparison, but were consistent within individual villages. Thus, it is evident that different ways of life transposed onto the built environment,

results in different housing typologies, as seen in the two villages studied. Evidence that education, income and accessibility are drivers of form and/or function, appears in the analysis of the ordinary, repeated houses within each setting.

A multi-method research design with case study as a strategy was developed to describe arguments in support of Kunguma and Tubusereia as embedded units within the broader Papua New Guinea case study area, and the use of focus groups, interviews, surveys and participant observation as the data collection methods. Kunguma and Tubusereia were chosen as the loci for this research because of their shared narrative history, illustrating the way colonialism shaped the development of housing, but equally because their emplacement within the landscape produced divergent forms of housing that could be analysed for perceptions of change that have occurred in PNG society since the early years of the 20th century.

Empirical data collection combined with historical, architectural, anthropological and ethnographic approaches has drawn together information on the processes that have influenced architectural transformation in two field study areas of PNG. The outcome of these findings is summarised in the following discussion. Comparing the diversity of conditions and social constructs that motivate the evolution and integrity of the traditional built environment addressed the objectives of the research which were to understand the transformation processes and to establish a link between traditional architecture, norms and values, which could contribute to the evaluation of appropriate, cost-effective and sustainable models of housing in PNG.

Although the significance of this research is the understanding gained of the processes influencing architectural transformation, further investigation into the traditional architecture of PNG must be undertaken with the urgency implied in the Village Studies Program. Based on the research findings, this author contends that many of the traditional house forms have ceased to exist, and many more will cease to exist in the future. However, as noted in the previous chapters, the concept of what people themselves describe as traditional is subjective when they just need a place to call home. Within the limitations of two small-scale village cases, the research led to the identification of key themes that contributed to an understanding of how people relate to their homes now, compared to how they related during colonial occupation, during the Village Studies Project, and in the intervening years, and whether their homes fulfil their current needs and future aspirations.

A significant observation was the correlation between house form, geographic location, climate and social structures which led to the contrast between the referenced Western

Highlands housing and Central Province housing. While social norms and values are major contributors to regional variants of the physical forms that serve to elicit stylistic differentiation, physical material finishes are largely determined in response to climate, available resources and economic circumstances.

In addition, this research has shown that while house architectures were regionally and culturally distinct, there was consistency within groups with evidence of shared cultural histories and traditions, while those in geographic proximity also showed similarity in architectural house form. The literature review highlighted that PNG has a long history of traditional building in tune with the environment, and in response to social constructs that have developed over time. Traditional methods of design and construction that are practical and sustainable have been handed down from father to son, with form and function varying according to location and region.

The documentation of houses in Kunguma and Tubusereia has shown that most of the traditional houses were in remote areas where physical access was difficult. However, it may equally be argued that this disparity is associated with the length of Colonial contact whereby traditions are more likely to be eroded in areas with longer contact, as demonstrated in the Coastal study area. The evolution and development that occurred due to external influences dating from mid to late 19th century have hastened the transformation process, which, coupled with homeowners' own desires, has produced significant changes in housing.

Furthermore, domiciliary patterns across the studied groups indicates that customary land tenure, whereby communities are connected through family lineage, has a large bearing on access to construction, maintenance and continuing occupational rights.

The findings of this research reveal significant implications for identifying values and norms related to traditional architecture in PNG. Foremost is the understanding that homeowners are the drivers of transformation and hold the right to determine the authenticity and integrity of what constitutes traditional housing in the modern urban fabric of PNG.

9.2 RESULTS OF THE EMPIRICAL STUDY

9.2.1 Values, Norms and Aspirations

Style and materiality varied (and evidently varies still) according to location, region and social behaviours unique to each of the study regions. Consequently, construction methods also varied because they depended on locally available materials in the different regions, and prevailing environmental factors such as climate and terrain. Nevertheless, there was a history

of exposure to alternative technologies through traditional trade routes and colonisation. These ideas and tools were either adopted or adapted to suit individual circumstances.

Family values were expressed as being important several times throughout this research. In the rural setting these values seemed to be based on extended family ties of trust and cooperation. It was also seen as the primary basis for social mobilisation and collective action. By contrast, in the urban setting, extended family ties based on trust and cooperation have become an entanglement of obligation and expectation that is seen by the emerging generation as negative ties from which they would rather extricate themselves. In a symbolic sense, family connections act as instances of contradiction; oppositional forces of tension, bound to the invisible past, continuing through the visible present, towards future horizons which are uncertain. Yet the implied value of these connections lies in their ability to act as mediation between the past and present; to craft an architecture that reflects a shared concern for refuge and validity beyond mere shelter.

Rapoport (1969) was instrumental in bringing attention to the cultural, social and environmental factors that determined the variability of design and construction of houses. This research considered those factors but also found that ideology and social relationships change over time, albeit sometimes slowly, and at other times, more rapidly. The Village Studies Project (Holden 2004; 2007; 2011) which provided a springboard for this research, noted the rapid deterioration of traditional housing in PNG and therefore focused on documenting the physical and material aspects of the ephemeral architecture, as a matter of urgency. Gonduan (2000) on the other hand also looked at social, cultural and environmental factors, but extended his study to include symbolic/ceremonial aspects of housing among the Iatmul in PNG. In doing so he considered the spatial layout of houses to provide a basis for understanding the use and meaning of the home environment, with the intention of adding to the discourse on culturally appropriate housing. Drawing on these prior studies, this research sought a broader overview of change and continuity. Social values considered here were the family structures within the community and the customs, beliefs and rituals in daily life that affect housing choices.

Intangible social values of extended family structure, and the status of the family within each community, are intrinsically linked to social norms that determine the economic exchange attached to traditional ceremonies such as bride price and *haus krai*. These in turn determine architectural values related to the multi-functional use of spaces, the location of the house in

relation to the ceremonial ground or centre of the village, the house as status symbol and, moreover, the separate spaces required for family units within polygamous structures.

The conclusions reached through research into two small communities, where there seems to be little desire for a return to the past, revealed that people are adept and confident in their ability to determine their own housing solutions, because they are immersed in the community and understand the norms and values that are meaningful to them. As an integral part of their own identity and place in the world, the social and symbolic value of the past, and the present that is influenced by it, are consequently not separable.

9.2.2 Patterns, Insights and Concepts

Typical urban housing, which has largely followed the Australian model of nuclear family living, is not applicable to most PNG situations, where responsibility to extended family means that form and function have been shown to be more important than aesthetics.

At Tubusereia, conflicting opinions were offered on the value of traditional housing, with most younger people, born after Independence, never having experienced living in such homes, and not considering them at all. Evidence from interviews suggested that the last remaining traditional house in the village was replaced in the late 1960s. Conversely, most older people preferred the traditional structures. They were said to be much cooler and the high-pitched roof provided a storage attic for yams set aside for seasons when food was short. Reasons for change in Tubusereia occurred because, inter alia:

1. Sheet metal became readily available around the 1960s and was easier to use, even though houses were hotter as a result.
2. Material resources were depleted, not only by Papuans but by foreigners, and hunters moving in and clearing the land. It is now almost impossible to obtain any basic building materials, and even kunai grass would need to be bought and transported from inland areas.
3. Skills have been forgotten and are no longer valued by young people. Most would remain living as they are. They acknowledge they have created a lot of pollution, but none seem overly concerned about fixing the problem themselves. Rather, they view it as the responsibility of the Government.
4. Low incomes and land tenure issues severely restrict opportunities for people to achieve their aspirations, despite their proximity to Port Moresby.

Thus, greater access to imported materials, whether bought or scavenged, and more exposure to Western influences, coupled with higher levels of education has seen a change in building practices, but not necessarily a change in traditional values and norms.

By comparison, at Kunguma, while the extended family is still the most important consideration when thinking about housing, the ready availability of traditional building materials combined with a lack of disposable income means that housing has not evolved as rapidly.

Traditional building practices survive, handed down through clan connections. Western style materials are not common and are often inappropriate for the climate. Furthermore, the physical difficulty of transporting materials by road, coupled with the cost, restricts the wholesale change that has taken place in more accessible areas. The Highlanders' access to land and their subsistence lifestyle, as well as comparatively low levels of education generally for those remaining in the village environment, contributes to slower change.

Attachment to land and the complex web of clan responsibilities appears stronger in the Highlands and has contributed to the retention of cultural values. Change has occurred at Kunguma because, inter alia:

1. Sheet metal became readily available and was longer lasting in the Highlands' wet climate, even though houses were colder as a result.
2. Although structural material resources were somewhat depleted, said to be heavily harvested by the Australian Timber Association (ATA) to build bridges and the town of Mt Hagen, many are still readily available in the nearby rainforest and some, like kunai grass and the lawyer vine used for fixing, are rapidly renewable in the fertile soil and moist climate.
3. Most would prefer to remain living as they are, but the desire for modern conveniences such as power, windows and running water, are driving the transformation.
4. Low incomes severely restrict opportunities for people to achieve their aspirations, yet modern homes represent status, which is extremely important in the social fabric of the village.

9.2.3 Urban Vernacular

Village cities and settlements, both formal and informal, are also places for traditional housing. It is important, therefore, to acknowledge what tradition means in villages and how it is interpreted through the urban lens. Whether there is any value in continuing the use of traditional architecture means considering culturally appropriate housing that is more than just shelter and survival.

The phenomenon of urban villages and settlements, and their ongoing growth, has made them the dominant morphology. Several elements central to urban settlements emerged as key features of this research. The first is that the development of place is tied to kinship and ethnicity,

including the importance of kin-based social networks formed in villages of origin. Urban villages have grown organically outside government jurisdiction. The second is customary land tenure that is linked to subsistence-based living and reciprocal obligations to traditional trading partners. Thus, kin-based communal values continue to be adapted to urban situatedness, including the strength of ties that contribute to socio-spatial patterns of traditional villages.

Compared with houses in formal urban areas, those in urban villages are frequently without sanitation, running water or electricity, as noted in Tubusereia, lowering the quality of life of residents, and hence calling for improved housing conditions. Nonetheless, evictions and obliteration of settlements like Paga Hill have done little to address the issue of housing quality and availability. Rather, understanding the relationship between emerging urban and rural norms and values will provide a greater impetus. In coming to a greater understanding of housing patterns in villages, this research has shown that while transformations in the built environment at the case study sites can be seen as a continuum of changes influenced by colonisation, missionisation and globalisation, these were not the sole drivers.

Transformation from traditional to contemporary housing has typically followed an evolution, where traditional building materials are gradually replaced with 'modern' materials. For example, roof thatching replaced with corrugated iron, and traditional wall materials gradually replaced with sheet metal or fibre-cement. This evolution has not resulted in an entirely new pattern of housing, but typically have retained a traditional layout suited to the social and cultural domiciliary patterns. The evolution is more obvious in Tubusereia which has had a longer association with colonists, and even more so for Hanuabada, which was used as a comparative baseline study. Because of its status as the village on which the colonial capital of PNG, Port Moresby, was established, it has also had the most sustained exposure to external influences.

The decline of traditional architecture described in this research is not unique to PNG. However, it is vital to stop resisting urbanisation as the cause of this decline and address the deeper social, economic and policy issues driving it. While growth and subsequent overcrowding have blurred the boundaries of what were once separate villages and hamlets, there is room for including the concept of Melanesian architecture by understanding the specific needs and desires that link rural villages with urban villages. Looking at the patterns and resources available in villages, and grass-roots perceptions about the value of traditional architecture in PNG, means a new model of sustainable Melanesian architecture can be

conceived, not preserving a utopian past but leaving room for these dynamic communities to embrace their own future housing aspirations.

This research was based on the premise that urban villages and settlements, are reflections of their rural counterparts. In a social sense this appears to be the case. Much of the available literature at the time of writing has supported this premise. Nevertheless, more recent trends indicate that there is a dissipation of village connectedness the longer migrants remain away from their villages, inter-marry or work in different orbits. Settlements and villages such as Tubusereia which were once homogeneous are no longer so. As pointed out in interviews, the upcoming generation want the benefits of kin-networks but no longer the obligation and constraints of reciprocity.

In contrast to the two case studies, the heterogeneous social structure of Hanuabada confirms that Motu traditional culture has been diluted, caught between the response to circumstances of colonisation and their historical reciprocal obligations to migrants.

9.2.4 Port Moresby/Hanuabada

Urban villages such as Hanuabada have historic reciprocal arrangements through trade and in addition to losing land to European settlers, have had to absorb an eclectic mix of other village groups. Thus, they are no longer a uniform group and, as such, cannot be categorised as all having the same housing needs. Migrants from the Gulf for example did not have the same cultural background nor house form or social structures as the Motu despite centuries of Hiri trading, Highlanders even less so.

Although many villagers are adapting to urban living environments, they should not be divided along rural and urban lines where housing is concerned. While their identities are intrinsically linked to their ancestral and cultural roots, their settlement areas tend to be those which are outside the planned housing areas. The blending of many, they are a product of continuous change, like the ebb and flow of the marine environment by which they live.

Accordingly, it is important to look to the social and economic village structures that favour housing enterprises based on traditional knowledge and self-help, rather than a system based on state ownership and control. Historically, Hanuabada has tended to its own development needs, including housing, even during colonial occupation. Because it is customary land, there has been little financial or infrastructure input from the Government, more particularly since Independence.

Chapter 2 highlighted the significance of preserving indigenous building knowledge both as cultural heritage and as a tool to provide affordable, sustainable housing in a contemporary context. It reflects the argument of this study, that traditional architecture is not static but is the result of ways of living developed to address specific local needs through trial and error, in response to local resources and climatic conditions, upgraded and improved incrementally as those needs evolved.

An important implication arising from this research is the understanding that there is non-alignment of government policy on housing in urban centres with the socio-cultural and decision-making processes in villages and settlements. The autonomous powers at all levels of government and the lack of strategic framework for the integration of housing policy and planning legislation has stymied progress, leading to an urgent call for change. This research has shown that social, cultural and environmental factors are critical to the future built environment of PNG, but so too is political will.

Assumptions about tradition should not be accepted without question. Localised claims on traditions of the past have, in some cases, been recreated for the present, to meet current economic and political agendas. The complexities of the cultural political context in PNG and the way in which the role of tradition is presented through the lens of nationalist ideology limits the narrative between tradition and modernity where architecture is concerned.

The evidence presented shows a disconnect between the values in villages and village-like settlements, and the widespread model of housing that has become the norm. This research shows that the conventional top-down approach to urban planning has not worked for PNG and it is imperative to reconceptualise a model that considers the bottom-up, iterative process of housing acquisition that meets the individual and collective needs of these communities. As Goddard (2019: 232) notes, '*a variety of nascent urbanites exist in contemporary Melanesia, and their future forms are as yet unpredictable, not least because Melanesians are still negotiating their own cultural differences as they continue to transform towns with diverse colonial legacies.'*

Field observations pointed to the pragmatism of recognising what the minimum standards of acceptable housing are in PNG (in addition to infrastructure, water and sanitation), across a diverse range of social practices, to avoid the wrong kind of development that few can afford. PNG is in a remarkable position at a time where motivation for change aligns with global movements that recognise the value of traditional architecture, while acknowledging that change

is inevitable, even desirable, and consequently requalification of what constitutes the traditional built environment is an ongoing obligation.

9.3 REVIEW OF THE RESEARCH QUESTIONS

In Chapter 1 two research questions and associated aims were stated. Key informants, village leaders, mentors and village participants from both Highlands and Coastal field sites provided the answers to the research questions. Each of those have been addressed in turn and the outcomes are summarised below.

9.3.1 Research Question 1

- What defines traditional architecture in the modern PNG era and how and why has it changed in the places in which it is anchored?

A comprehensive review of previous studies, and the empirical evidence gained though this study, indicate that traditional architecture in the modern urban fabric of PNG, while linked to the past, sits somewhere between forgetting and remembering. In other words, it is a composite or hybrid model, drawing on a rich past, in which the multiplicity of previous architectures exists beside the most recent.

A number of earlier studies were reviewed and compared with this study, demonstrating that the notion of a singular architectural tradition has never been part of the history of PNG, and that the transition away from tradition can therefore not be answered with a singular solution. A comparison of data derived from the selected villages showed significant differences between the two in terms of materiality, form, cost, and extent of modernisation. However, it also showed significant common societal factors leading to the retention of traditional values.

Generally, in Kunguma new building works considered as conforming with traditional patterns were still single-room, ground level dwellings emplaced within a landscape of productive gardens. As household composition changes, economic conditions improve, or status within the community increases, a separate *Haus Kuk* or houses for additional wives are added adjacent to the main sleeping house. Nevertheless, electricity, running water and flushing toilets are not available. Building materials in these circumstances are almost exclusively locally sourced on clan lands, and consist mainly of timber, roof thatching and woven walls.

The next physical evolution was the inclusion of window openings and occasionally a concrete floor slab, however, these houses still typically retain the traditional layout, despite being built from ephemeral materials, and therefore not necessarily constructed on the same

footprint. Often a new house would be constructed before the old home is dismantled or falls into disrepair. The addition of internal rooms and raised sleeping platforms is also not uncommon at this stage. The final stage of transformation from a material aspect is the situation where local resources are abandoned for external resources purchased on the open market, and an emerging trend towards houses raised on short stumps, adding water tanks and, in rare cases, flushable toilets.

Tubusereia follows a similar evolutionary pattern, the main difference being that at the time of colonisation the houses in this area were already on high stumps. Gradually imported materials replaced locally sourced, the addition of window openings and internal rooms has become more prevalent and houses have become larger, noticeably those with secure land tenure and monetary income. Nevertheless, running water and sanitation are unavailable for most residents and electricity supply is unreliable. Tubusereia has had a longer exposure to colonisation, as previously noted and as a result a more extensive depletion of locally available building materials. Being more reliant on the cash economy than Kunguma, means the ability to secure sufficient funds is severely hampered and overcrowding is endemic.

The beneficial aspects of traditional housing in the contemporary urban fabric of PNG when compared to modern housing, is the lower construction cost. This is achieved through community participation, a major feature of PNG society in general. Family ties and reciprocal arrangements continue to play a large part in house construction, including customary land tenure, material procurement and in-kind labour.

Moreover, there is little evidence to suggest that time to procure materials or construct a traditional house, or indeed a more modern equivalent, has any impact on obtaining a house as a basic need, as long as it is outside formal urban areas. Lifestyles in this sense have remined basically unchanged in terms of the benefits of social connection networks and customary land.

During fieldwork at both Kunguma and Tubusereia, informants reported that the most negative aspect of traditional housing was not the housing itself but the lack of services such as power, reticulated water and sanitation. This was especially evident at Tubusereia, which, despite its proximity to Port Moresby is inadequately serviced.

Traditional builders at Tubusereia noted that the move away from traditional building in the 50s and 60s was the excitement of something new, but subsequently also the depletion of freely available and accessible natural resources as the city of Port Moresby expanded.

Hence, traditional architecture is defined by social, economic and environmental constraints affected by external factors beyond the control of villagers but also by internal factors such as individuals' desire for change.

9.3.2 Research Question 2

- Can lessons be learned from the remaining traditional building to inform building design and construction that can better serve modern PNG in areas where Western influence and the aspirations that it has generated have largely displaced traditional norms and values?

The research design employed in this study and consequently the data collection methods, allowed participants to articulate their values, knowledge and lived experience regarding aspects of traditional architecture that are pertinent in the contemporary context. The shared insights provide a broader understanding of the remaining traditional architecture to inform the design of buildings that can better serve modern PNG. The method chosen for this study was selected to test the notion that there is a deficiency in PNG planning policy which makes little allowance for the inclusion of housing as an important consideration.

It is encouraging to note there is ongoing work in the area of culturally sensitive and sustainable traditional architecture being conducted by the National Research Institute (NRI), government advisors, and other researchers to address the housing issues associated with urban villages and settlements in PNG that draw on traditional values. Nevertheless, despite the plethora of these report, few recommendations have been implemented. The results of this study can contribute to the body of knowledge and dialogue.

Although it is a unified Nation in a political sense as a result of its colonised history and subsequent Independence in 1974, the extent to which PNG is in a position to construct its own definition of development or a singular Melanesian architecture remains as elusive as constraining the arbitrary customary boundaries between the many tribes, cultures and geographic environments that the country is renowned for.

The complexity recognised by Narokobi, when he called for a Melanesian Way (Golub 2016), and reiterated by Gonduan (2000) whose research discussed the Melanesian transitional dwelling as a unique experiential encounter, is also borne out by this research. The people spoken with unequivocally expressed a desire to embrace both tradition and modernity, developing a unique PNG architecture that is a fusion of both ways of living, which includes the notion of change incorporating lessons of the past.

Written into the PNG National Constitution are development directives, one of which is 'Equality and Participation' (National Parliament of Papua New Guinea 2020: 2). However, the mechanism for accessing any meaningful participation in the development of the country, at the village level, does not appear to exist. The status quo in this regard will continue if policymakers cannot address the conflict between loyalties to the more significant tribal structures and those of the Local, Regional or indeed National Governments.

9.4 CONTRIBUTION TO KNOWLEDGE

A review of previous studies showed a gap in research regarding traditional architecture in PNG, especially in recent years. Significant results emerged from the empirical study that supplement previous research and that can also be expanded upon.

Reinforcing the notion that the past influences the present, and furthermore that village architectural traditions influence urban development, this research contributes to the body of knowledge regarding housing at the village level, to provide alternative authentic voices with respect to current housing approaches in the urban fabric of PNG.

Comparing two culturally different field areas has shown that customary or traditional architectural practices are not immutable or unchanging. At Kunguma, traditional housing has not been abandoned, but many contemporary ideas have been incorporated. At the same time, albeit with longer colonial contact, most people at Tubusereia now build and live in more permanent non-traditional buildings. Consequently, both can be described as transitional; contemporary indigenous forms in a generative sense, with respect for their traditional links and the contemporary world in which they are entwined.

This study extends architectural research in PNG by considering not only the physical structure of domestic dwellings, but the related anthropological, ethnographical, social and developmental perspectives that contribute to an understanding of specific features that are important to occupants. The research has shown that traditional knowledge at the village level, passed down from generation to generation fulfils the changing needs of each emerging generation. Encouraged by respected leaders, it contributes to a sense of continuity and belonging while nevertheless being open to innovation and change.

This research was undertaken with the specific intent of avoiding external predisposition towards standardised design and planning research instruments and, thereby, offer a significant and effective approach that would enhance architectural research with methodological

frameworks from the social sciences disciplines. The framework provides an alternative way of looking at architectural design through a cross-cultural, social perspective. When considering Sustainable Development Goals, the methodology employed holistically captures and illuminates input from the people most involved with producing most housing in PNG. However, development is not in itself a destination but rather a journey to improve peoples' quality of life. To succeed it must account for the multiplicity of cultural mores that contribute to the social fabric of any nation. For housing in PNG, a land of many contrasts, this requires a synthesis between tradition and contemporary modes of living expressed through peoples' preferences and lived experience in their remarkably diverse environments.

9.5 RECOMMENDATIONS FOR FURTHER RESEARCH

> *The knowledge historians make, like the taro that comes out of our gardens, cannot sit, uneaten, on library shelves. The vitality of Pacific history is in the process of scholarship, not its products. As we say in my culture, when you finish reading something, you must commit to going back and rereading it, so that you do not forget it and it will be with you your whole life. On this account, there is no such thing as being learned, only doing the act of studying (Golub 2016: 2).*

The findings of this research suggest several possibilities for further research into traditional architecture in PNG, and a reinvigoration of vernacular architecture studies that reflects the changing research landscape. It is only through the continuing act of scholarship, whether formal or in the village setting, that historical lessons are not forgotten.

9.5.1 Recommendation 1

This study was based on a single-case study with two embedded units of analysis. Two village communities, in the Western Highlands and on the coast in Central Province, showed a diverse built form, not only because of their geography but because of their social and cultural divisions. The original intent of this research was to compare four distinct geographical regions, one of which was the islands of PNG. There are several architectural studies previously undertaken in these regions that could be built on. While several architectural studies have previously been undertaken (e.g. Costigan's 1995 study of the pattern of structure in the Trobriand Islands), there is potential for that research to be expanded. New Britain, Manus Island and Bougainville are others that could provide further research opportunities. Socially,

environmentally and culturally these islands are distinct from the communities of this research and therefore would present an opportunity for additional comparative research.

Another geographic region initially proposed for this research was the Sepik, a riverine community. This region has a long history of anthropological and archaeological research that can be drawn upon (see for example Craig's Upper Sepik-Central New Guinea ARC Linkage Project), along with architectural documentation completed during both the Village Studies Project and Gonduan's study of the Iatmul. Gonduan (2000) commented on Melanesian shelter needs being integral with social, cultural, economic and developmental relationships and the importance of maintaining this balance. Considering the passage of time since he undertook his research, a follow-on study would provide the basis for a longitudinal comparison.

There are also several villages in the Gulf of Papua with histories of anthropological research that could be drawn upon. Generally, the focus of previous studies has been the ceremonial houses and their associated rituals. Many of these now have little relevance to the values and norms of contemporary housing in PNG, but those that do provide an opportunity to learn from what may well be the last remaining traditional architectures of PNG.

9.5.2 Recommendation 2

There is a wide range of traditional building materials used across various regions in PNG, that remains relatively unexplored. Further studies could explore the use of other materials in different regions thus expanding on what was produced from this study in the Highlands. A cross-disciplinary study of ecologically useful plant-based building materials would be useful. Throughout this research it was often difficult to identify useful species, particularly those which could only be identified by respondents with *tok ples* names.

The imaginative use of a limited number of locally available building materials in WHP could be explored through collaboration with other disciplines. For PNG, affordable must also be durable, must suit the environment and must develop capacity building by being locally sourced. As previously shown, Addison and Frame set the precedent for using traditional thatching in the modern context in PNG, while maintaining the required standard for commercial building. It could be advantageous to consider both old and new knowledge regarding the use of local building materials when exploring ways to overcome housing affordability issues in PNG. Introduced knowledge in synthesis with traditional knowledge can add depth and substance to the body of knowledge and may contribute to a valuable data base of natural resources for future sustainable development.

9.5.3 Recommendation 3

PNG is subject to a wide range of issues which affect housing. This research has mentioned in passing the past effects of earthquakes and volcanic action, but there appears to be scant research into how traditional PNG architecture responds to these events, nor what facilities are in place to manage such disasters in the future, particularly in the more remote, yet highly populated, rural areas. A rain-induced landslide during fieldwork at Kunguma in 2017 brought this to the fore. Access to and from the village was hampered, not only by the lack of infrastructure planning and availability of machinery to effect repairs, but also because of conflict between adjoining tribes controlling right of access. Larger landslides and earthquakes have more dire consequences and much longer roads to recovery as seen more recently in the Southern Highlands. Thus, avenues for research into design in the context of disaster management in PNG could be placed into the global debate.

9.5.4 Recommendation 4

To overcome the limitations experienced during this study, any research that relates to the preservation of architectural archival material would add value for future researchers. By making the collection more readily available, the potential to learn more about the traditional architectures of PNG would be greatly enhanced, as would opportunities for inter-university research collaboration. The AHC identified the following projects as having priority:

- Digitising and archiving the records of the architectural heritages of Papua New Guinea
- Undertaking recording and research work on those heritages

In 1979, a UNESCO Symposium on *"The Preservation of Traditional Living Art in Oceania"* incorporated several proposals, one of which was that governments provide for the establishment of technological facilities that would enable the arts of Oceania to be properly conserved. Some forty years later, there is much scope for accepting this challenge with further exploration in this field to augment other built environment studies.

9.5.5 Recommendation 5

One of the overriding issues brought up by participants during this research is the perceived general torpor of Government agencies to get anything done. Housing policy has consistently focused on Government underfunded urban supply without considering consumer demand. Moreover, the lack of affordable housing has been consistently blamed on constraints to land held under customary title. Disappointingly, the National Research Institute (2016: ix-x)

confirms that several reports on housing affordability have been prepared since 1978, but most of the recommendations, while technically sound, have not been implemented. While alienated land in urban areas remains an issue, as this research has found, it is one that is unlikely to be resolved in the conceivable future. Moreover, although it was only touched on briefly by participants, bureaucratic corruption or ineptitude were seen to be more culpable.

While housing estates in urban areas may seem desirable, a review of policy that considers the needs of the vast number of PNG people who are locked out of this either economically or because they are simply not interested in this kind of development. Findings of this research have shown that most reports have been based around consultations with property and housing developers who have a vested interest over and above the needs of the community. Hence this recommendation is for a review of housing policy that considers the pivotal role individuals play in meeting their own housing needs, drawing on traditional knowledge and kin-based connections as the most reliable way of housing themselves.

9.6 CONCLUDING REMARKS

> *The nature of our housing, no matter of what culture and of what year, communicates an undistorted impression of the human condition. In that sense, housing – whether fixed abodes or nomadic in nature – has always shaped the quality of human life (Ebner et al. 2010).*

The preceding section sets out several suggestions for further research which would build on this work, and that of others referenced herein, and contribute further to the resolution of the complex problem of housing in PNG. This research has concentrated architectural analysis on current problems of residential architecture in villages and village-like settlements in PNG. Typological analysis has not focused on the organisation of living spaces or architectural design as discussed by Gonduan (2000), but on the common threads that link buildings to social, economic and cultural needs of diverse groups and address the question of identity and tradition embedded in each community.

The research reported in this thesis was limited to two relatively small villages, but nonetheless represents a step forward in the study of traditional architecture in PNG. The methods described and the results produced add substantially to unravelling the problem of what traditional architecture means in the modern urban fabric. In the places researched here, a traditional home is perceived as one that meets a family's continuing growth across

generations, wherein spatial qualities and social connectedness are equally important to functional aspects because '*homes are special places in one's life'* Gonduan (2000).

While it is clear that in both urban and rural areas many housing problems are hampered by lack of money, problematic land tenure and the inadequate provision of infrastructure, the overriding sentiment expressed by people at Kunguma and Tubusereia is that housing policy in the country has almost entirely ignored the population at large. There is, without doubt, a need to improve the living conditions in urban villages and village-like settlements, but most people acknowledged that they have given up waiting for government action.

State intervention in housing since Independence has to date been erratic and has made little impression. Rural and urban people at both study areas expressed a deeply cynical view of government promises, some stating outright that Australia should stop giving aid money because it is never used for its intended purpose and certainly never filters through to those without access to the most basic services.

Because this study included ethnographic fieldwork, with it come responsibilities beyond the recording of information, as it involves imposing on the generosity of people we wish to study for our own ends. Although obtaining ethics approval is a rigorous process for academics, it is a researcher's responsibility to be sensitive to the thoughts, behaviours and expressions of people in the field, to look for contextual nuances and to maintain future connections after leaving the field.

One of the ethical dilemmas of leaving the field was discussed in a case study about *'ownership of ideas and things'* at the Kuk prehistoric site in Western Highlands Province. As Muke (2013) noted, changing perceptions of ownership, and custodianship of material cultural heritage, have created new expectations about intellectual property and the commodification of culture. Thus, the people who built long-term relationships with archaeologists, anthropologists and other academics over many years, and who are governed by the politics of reciprocity, may feel exploited. This research recognises and acknowledges that traditional architectural knowledge may fall into this category, yet participants in this study also spoke openly about wanting their voices heard. There is a desire at the grassroots level to engage with research and to have the resulting outcomes disseminated more widely.

In conclusion, the evidence of this research shows that housing in urban villages and settlements can, and does, benefit from traditional architectural knowledge, and if lessons from remaining traditional values are heeded, such knowledge can drive new, achievable ways to

establish housing models that continue to meet the aspirations of future generations; threading the past and the present while looking to future horizons.

There is no single solution; in a nation of many different cultural values, there is no single way of living.

That is PNG – endlessly bewildering (Sean Dorney 2016: 10)

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Appendices

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Appendix A

Remoteness Indicators

ARIA+

ASGC (Australian Standard Geographical Classification) Remoteness Areas (based on ARIA+ index values—an enhanced version of the ARIA index values)(University of Adelaide 2015)

ARIA+ measures access in terms of remoteness along a road network from 11,914 populated localities to five categories of service centres (service centres with more than 250,000 persons; with 48,000 to 249,999 persons; with 18,000 to 47,999 persons; with 5,000 to 17,999 persons; and with 1,000 to 4,999 persons). An adjustment is made for localities situated on islands (including Tasmania).

For each locality, the distance to each of the five categories of service centre is converted to a ratio to the mean. To remove the effect of extreme values, a threshold of 3 is applied to each component and then the five component index values are summed. This produces a continuous variable with values between 0 (high accessibility) and 15 (high remoteness). Index values for an expanded locality and point database of 42,648 localities are then interpolated to produce an index value for 1km grids and averages calculated for larger areas such as postcodes or SLAs.

Remoteness Index

RI (Remoteness Indicator) United Nations Development Policy and Analysis Division (DPAD) (UN Department of Economics and Social Affairs 2014)

RI measures the trade-weighted minimum distance for a country to reach a significant fraction (i.e., 50%) of the world market. In order to account for relatively higher transportation costs and related handicaps of landlocked developing countries, a constant factor is added to the trade-weighted minimum distance for these countries. Remoteness reflects high transportation costs and limits the possibility for economic diversification, thereby reducing the ability of countries to respond to trade shocks. The indicator is calculated based on data on geographic distance between the capitals or major cities in the world (obtained from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and data on exports and imports of goods and services from United Nations Statistics Division, National Accounts Main Aggregates Database.

Remoteness and Dispersion Index

RDI (Remoteness and Dispersion Index) World Bank (2014a)

RDI measures two components; the GDP weighted distance from global markets for each country, and the exclusive economic zone (EEZ) of each country, giving equal weight to both.

Appendix B

Fieldwork Research Support Team

KEY INFORMANTS

KUNGUMA/GATEK	DETAILS
Bernadine Danomira	LLB Law, JCU Graduate Certificate Development Practice, UQ Cultural Facilitator
Rosita Henry	Professor of Anthropology; Head of Department of Anthropology, Archaeology and Sociology at James Cook University

TUBUSEREIA	DETAILS
Igo Gari	Master of Public Policy, Public Policy Analysis, Lee Kuan Yew School of Public Policy. PhD candidate at Bond University. Co-founder of 2018 "Hiri" (now ProReef) coral restoration processes for rural communities in Papua New Guinea and Fiji.
Felix Daroa	Village chief and conservation practitioner. Expertise in protecting, replanting, rehabilitating and conserving mangroves and the marine environment in Tubusereia. He holds a Certificate in Biodiversity Conservation from UPNG.

CULTURAL STUDIES WORKSHOP FACILITATORS 2016/2017

KUNGUMA/TUBUSEREIA	DETAILS
Rosita Henry	Professor of Anthropology; Head of Department of Anthropology, Archaeology and Sociology at James Cook University.
Matthew Leavesley	Adjunct Senior Research Fellow, College of Arts, Society & Education Centre for Tropical Environmental and Sustainability Science at James Cook University and Senior Lecturer, Anthropology, Sociology and Archaeology, School of Humanities and Social Sciences at University of Papua New Guinea.
Borut Telban	Head of Anthropology Department at the Institute of Anthropological and Spatial Studies, Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU) and a member of the Research Council at ZRC SAZU.
Linus Digim'rina	Strand Leader, Anthropology, Sociology and Archaeology, School of Humanities and Social Sciences at University of Papua New Guinea.

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CULTURAL STUDIES STUDENTS JCU/UPNG

KUNGUMA / GATEK 2016-2017	TUBUSEREIA / MOTUPORE 2017
Paul Bowell	Tepsi Beni (Port Moresby)
Rowena Bullio	Yvonne Hani (Pari)
Sophie Byrne	Benjamin Leme (Wabag)
O'Keefe Eason	Dominic Kerua (Highlands)
Jack Growden	Elai Soutai (Sepik)
Samantha Harbort	Rosie (Lae)
Mallory Notting	
Melisa Scalon	
Mark Sulovski	
Chloe Thomason	

MENTORS / BUILDERS

KUNGUMA / GATEK 2016-2017	KUNGUMA / GATEK 2017
Councillor John Kawa	Councillor John Kawa
Councillor Peter Raim	Councillor Peter Raim
Thomas Las	Thomas Las
Kuipa Tugl	Kuipa Tugl
Nori Kupal	Nori Kupal
Thomas Nori	Patrick Don
Stephen Kuipa	Joe Nongr
Mawa Aiya	Arolyn Ai Kawa
Monal Pup	Bomoke Ereme
Arolyn Ai Kawa	Simieon Raphael
Helen Samuel	
Kathleen Piam	

TUBUSEREIA / MOTUPORE 2016-2017
Gari Ranu
Roy Hanua
David Mahuta
Iubu Kedea
Vara Tamarua
Boni Biga
Felix Daroa

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Appendix C

Key Informant Genealogy

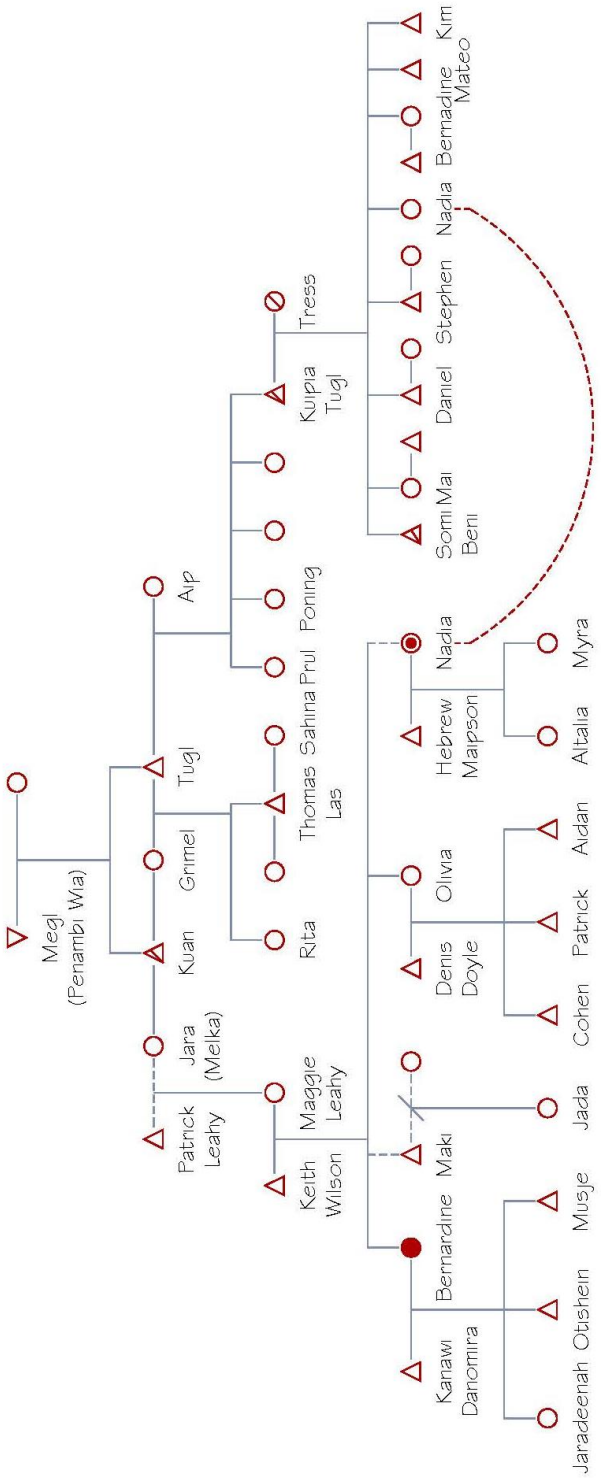

Figure 9.1. Bernadine Danomira Kunguma Family Tree

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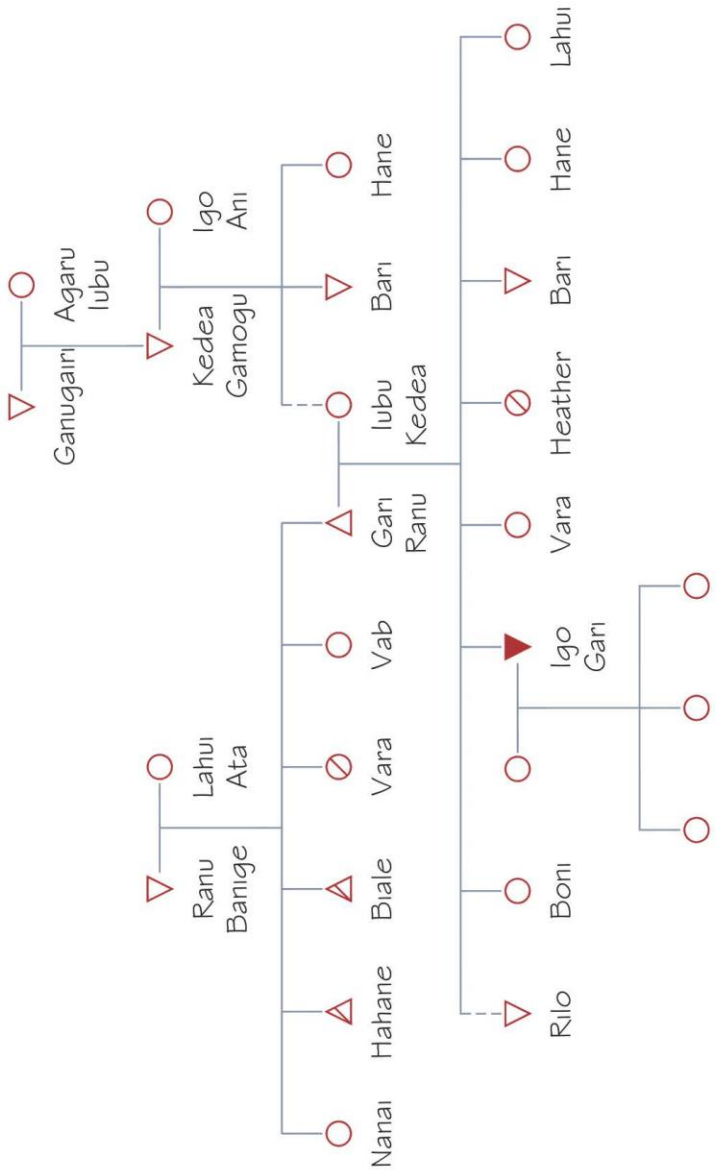

Figure 9.2. Igo Gari Tubusereia Family Tree
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Appendix D

Qualtrics Survey

General Survey Questions

Informed Consent Form must be signed by Participants

9.6.1 Q2.1 Informed Consent Form Introduction

As part of a Doctoral Degree research project at Bond University, Queensland, Australia, I am investigating traditional architecture in Papua New Guinea (PNG). The purpose of this survey is to seek your perceptions of the values and benefits of planning and construction of buildings in villages and settlements in recent times that are not provided by government or aid agencies.

Your participation in this survey is greatly appreciated. All your responses will be kept strictly confidential unless you specifically request acknowledgment. All questionnaires will be concealed, and no one other than the researchers working on this project will have access to them. You will be asked questions about yourself and building in your village. The survey should take approximately 20 minutes. Questions are designed to determine how you get permission to build, obtain materials for building, and arrange for the construction of homes in your area. You have been contacted to participate in this survey because you are considered a stakeholder and your opinion is important. There are no direct benefits for participants. However, it is hoped that through your participation, researchers will learn more about what type of housing is being built by villagers on customary land, as well as formal and informal settlements, and this will help us understand what housing is preferred and what can be done about affordable housing issues for PNG people.

Q3.1
Personal Details

Name

Address

City/Town/Village

Province

Postal code

Country

Builder Evaluation Question

Q4.1
Are you the builder or helping a family member or friend to build, but are not the owner of the home? If you are the builder, you only need to answer **Sections 8 and 10** of this survey for questions about building.

- ❍ Yes
- ❍ No

Homeowner Personal Demographic Questions

Q5.1
For how many years have you lived in this area?

_____Years

_____Months

_____Weeks

Q5.2
With what ethnic background do you identify? You may select more than one answer if necessary.

- ❑ Papuan
- ❑ New Guinean
- ❑ Papua New Guinean
- ❑ Melanesian
- ❑ Pacific Islander
- ❑ Australian
- ❑ Caucasian
- ❑ Asian _____
- ❑ Mixed _____
- ❑ Other _____
- ❑ Prefer not to answer

Q5.3
What is your gender?

- ❍ Male
- ❍ Female

Q5.4
How old are you?

- ❍ 18-25
- ❍ 26-34
- ❍ 35-64
- ❍ 65 or over
- ❍ Unsure
- ❍ Prefer not to answer

Q5.5
Please indicate the highest level of formal education that you have completed.

- ❍ Primary school
- ❍ Some high school or less
- ❍ Graduated from high school
- ❍ Some college or technical school
- ❍ Graduated from community college or technical school
- ❍ Graduated from four-year university
- ❍ Post-graduate
- ❍ Prefer not to answer

Q5.6
What is your current employment status?

- ❍ Employed full-time by others
- ❍ Employed part-time by others
- ❍ Operate own business
- ❍ Retired
- ❍ Temporarily unemployed
- ❍ Full-time student
- ❍ Not employed at all
- ❍ Prefer not to answer

Q5.7
What is your occupation or the main work that you usually do?

Q5.8
What is your average weekly household income (from all sources)? If you do not feel comfortable answering this question you may move to the next question. This information will however assist in understanding how income affects access to housing. K = Kina

- ❍ K 100 or less
- ❍ K 101 - K 200
- ❍ K 201 - K 300
- ❍ K 301 - K 400
- ❍ K 401 - K 500
- ❍ More than K 500
- ❍ Prefer not to answer

Q5.9
Do you own the home that you live in or are building?
- ❍ Yes
- ❍ No

Q5.10
Are you helping/did you help to build this home? It is important for this research to know whether family or owners contribute to the labour of building as owner-builders even if another builder is used.
- ❍ Yes
- ❍ No

Q5.11
For how many years (approximately) has this home been built? (if your home is already finished).

- _____Years
- _____Months
- _____Weeks
-

Q5.12
With whom do you live?
- ❍ In a married-couple family
- ❍ In a family with female householder, no husband present
- ❍ In a family with male householder, no wife present
- ❍ In a group of related families
- ❍ In a group of unrelated subfamilies
- ❍ Unrelated individuals _____

Q5.13
How many adults are currently living in your home?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5 + _____

Q5.14
How many children (under the age of 18) including your own, are currently living in your home?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5 + _____

Q5.15
What are the age(s) of children living in your household? Check all that apply.

- _____Under 5 years old
- _____5-11 years old
- _____12-18 years old

Q5.16
When deciding to build how is the arrangement reached between you and the person/persons building your home? Please tick any items that are relevant to how you would agree about what to build and the cost of building if you are not building the house yourself.

	Family Agreement	Builder Agreement	Own Decision
Choosing the site for your home	❑	❑	❑
Designing the home	❑	❑	❑
Choosing the builder	❑	❑	❑
Verbal agreement	❑	❑	❑
Written agreement	❑	❑	❑
Paying the builder	❑	❑	❑
Choosing building materials	❑	❑	❑
Payment for building materials	❑	❑	❑
Sourcing and buying building materials	❑	❑	❑
Legal approvals	❑	❑	❑
Government approvals	❑	❑	❑
Land ownership proof	❑	❑	❑
Other	❑	❑	❑

Q5.17
How was this building work paid for?
- ❍ As resources allow
- ❍ Bank loan
- ❍ Family loan
- ❍ Bartering
- ❍ Other _____

Q5.18
Do you have any form of building contract or terms of payment?
- ❍ Yes
- ❍ No

Answer If Do you have any form of building contract or terms of payment? Yes, Is Selected

Q5.19
What type of contract do you have? If you are able to describe the process in more detail, please do so.

Q5.20
What do you like most about this home? Please describe.

Q5.21
What do you consider needs improvement? Please describe and give your reasons why.

Q5.22
Are you planning more buildings on this land in the future?
- ❍ Yes
- ❍ No

Answer If Are you planning more buildings on this land? Yes, Is Selected

Q5.23
What are these new buildings for?

	Would you build the same type of building as you already have or a different type?	
	Same	Different
Rent	❍	❍
Own use	❍	❍
Family	❍	❍
Business	❍	❍
Other - Specify	❍	❍

Answer If What are these new buildings for? Other - Specify - Would you build the same type of building as you already have or a different type? - Different Is Selected

Q5.24
What are your reasons for building differently?

Homeowner Questions about Land

The following questions will give you an opportunity to tell us more about your knowledge of land ownership in your area.

Q6.1
How do you understand the idea of land ownership in your village/community? Please answer openly, and to the best of your knowledge describe how land ownership is agreed upon in this area.

Q6.2
How is this land demarcated? Please explain the usual way that people know what their land is. For example, are there any physical markers that show which is your land? Select all that apply.

	How often are these methods used?			Who decides about land ownership security?				
	Always	Sometimes	Never	Clan leader	Village	Government	Family leader	Other
Verbal agreement	❍	❍	❍	❑	❑	❑	❑	❑
Written agreement	❍	❍	❍	❑	❑	❑	❑	❑
Legal Lease	❍	❍	❍	❑	❑	❑	❑	❑
Legal Freehold	❍	❍	❍	❑	❑	❑	❑	❑
Visible barrier	❍	❍	❍	❑	❑	❑	❑	❑
Other	❍	❍	❍	❑	❑	❑	❑	❑

Q6.3
How is the outdoor space defined and used? Please explain whether you have any space around your house or elsewhere in your area for outside activities like gardening or keeping animals.

Q6.4
How do you determine private or community space? Please describe how people know which is land only for you to use or which land can be used by anyone in the village/town.

Homeowner Questions about Facilities

Q7.1
In your house is there a separate space for cooking?
❍ Yes
❍ No

Answer If In your house is there a separate space for cooking only? No Is Selected

Q7.2
Where do you usually prepare your meals?

Q7.3
What type of stove/cooking method do you have?

Q7.4
What are the advantages/disadvantages of this method?

Q7.5
Do you have running water in your home?
- ❍ Yes
- ❍ No

Answer If Do you have running water in your home? No Is Selected

Q7.6
If you have no running water where do you get and store your water?

Q7.7
Do you have a separate space for bathing or washing in your home?
- ❍ Yes
- ❍ No

Answer If Do you have a separate space for bathing or washing in your home? No Is Selected

Q7.8
Where do you go to bathe or wash?

Q7.9
Do you have a toilet in your house?
- ❍ Yes
- ❍ No

Q7.10
What kind of toilet are you using?

Q7.11
Where is the toilet located?

Q7.12
Approximately how many metres from the main house is the toilet located?

- _____ metres

Q7.13
Approximately how many metres from the water source is the toilet located?

- _____ metres

Homeowner Questions about Traditions and Lifestyle

Q8.1
Are there rules that people have to follow before and during the building of their homes?

- ❍ Yes
- ❍ No
- ❍ Unsure

Answer If Are there rules that people have to follow either before, or during the building of their homes? Yes Is Selected

Q8.2
Are these rules written or told to you in some other way?

- ❍ Written
- ❍ Verbal
- ❍ Unsure

Answer If Are these rules written or told to you in some other way? Written Is Selected And Are these rules written or told to you in some other way? Verbal Is Selected

Q8.3
What rules do you know about? Please explain in your own words any rules that you know of that are important to consider before building your home.

Q8.4
Do you think it is important to have rules in your village/community that relate to building? Please explain why/why not.

Q8.5
Who makes the building rules for your village/area?

	Always	Most of the time	About half the time	Sometimes	Never
Clan leader	❍	❍	❍	❍	❍
Village	❍	❍	❍	❍	❍
Family leader	❍	❍	❍	❍	❍
Government	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Q8.6
Who makes the decision about when and where a new home is built?

	Always	Most of the time	About half the time	Sometimes	Never
Clan leader	❍	❍	❍	❍	❍
Village	❍	❍	❍	❍	❍
Family leader	❍	❍	❍	❍	❍
Government	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Q8.7
Does your village have a preference for a certain style of dwelling that you know of? Please describe layout, design, features, and so on.

Q8.8
What would you describe are the key characteristics of a PNG/Melanesian house? Please give your opinion of what a PNG house is like in your area.

Q8.9
What is a 'modern' house in your opinion? Please select what you believe is a Modern House in your area and add the facilities that you think are also important.

	Modern House Types	Does a Modern House also include other facilities?		
	Answer 1	Running Water	Flushing Toilet	Electricity
European Style	❍	❑	❑	❑
Prefabricated	❍	❑	❑	❑
Built by Others	❍	❑	❑	❑
Village Built	❍	❑	❑	❑
Other	❍	❑	❑	❑

Q8.10
What building materials and construction techniques are used in this village that you are aware of?
Please select all that apply.

	Always	Most of the time	About half the time	Sometimes	Never
On stumps	❍	❍	❍	❍	❍
On the ground	❍	❍	❍	❍	❍
Woven walls	❍	❍	❍	❍	❍
Timber walls	❍	❍	❍	❍	❍
Metal walls	❍	❍	❍	❍	❍
Fibro walls	❍	❍	❍	❍	❍
Concrete block	❍	❍	❍	❍	❍
Thatched roof	❍	❍	❍	❍	❍
Metal roof	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Q8.11
If you think of a house as traditional, what features do you think of? Please describe any style or cultural things that might be important for houses in your area that are similar to what was used in earlier times.

Q8.12
Are there many people in your area, who know traditional building methods? If yes, please state who you think would know these methods.

❍ Yes _____
❍ No
❍ Unsure

Q8.13
In your opinion how well do the houses in your area suit your environment and way of living?

	Extremely good	Somewhat good	Neither good nor bad	Somewhat bad	Extremely bad
Climate	❍	❍	❍	❍	❍
Terrain	❍	❍	❍	❍	❍
Facilities	❍	❍	❍	❍	❍
Culture	❍	❍	❍	❍	❍
Ecosystem	❍	❍	❍	❍	❍
Resources	❍	❍	❍	❍	❍
Family life	❍	❍	❍	❍	❍
Social life	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Q8.14
Please give your rating of the features of 'traditional' homes listed below.

	Extremely good	Somewhat good	Neither good nor bad	Somewhat bad	Extremely bad
Roof Material	❍	❍	❍	❍	❍
Wall Material	❍	❍	❍	❍	❍
Layout of Rooms	❍	❍	❍	❍	❍
Breezes	❍	❍	❍	❍	❍
Natural Light	❍	❍	❍	❍	❍
Comfort	❍	❍	❍	❍	❍
Size	❍	❍	❍	❍	❍
Location	❍	❍	❍	❍	❍
Lifestyle	❍	❍	❍	❍	❍

Q8.15
Please give your rating of the features of 'modern' homes listed below.

	Extremely good	Somewhat good	Neither good nor bad	Somewhat bad	Extremely bad
Roof Material	❍	❍	❍	❍	❍
Wall Material	❍	❍	❍	❍	❍
Layout of Rooms	❍	❍	❍	❍	❍
Breezes	❍	❍	❍	❍	❍
Natural Light	❍	❍	❍	❍	❍
Comfort	❍	❍	❍	❍	❍
Size	❍	❍	❍	❍	❍
Location	❍	❍	❍	❍	❍
Lifestyle	❍	❍	❍	❍	❍

Q8.16
When you consider home building in the village, do people usually help each other or work as individuals?

	Always	Most of the time	About half the time	Sometimes	Never
Individuals	❍	❍	❍	❍	❍
Community effort	❍	❍	❍	❍	❍

Q8.17
Based on your own experience and way of life, do you think houses should provide for a single family or extended family living these days?

	Always	Most of the time	About half the time	Sometimes	Never
Single family	❍	❍	❍	❍	❍
Extended family	❍	❍	❍	❍	❍

Q8.18
Do you think modern houses can provide for PNG lifestyles?

	Definitely yes	Probably yes	Might or might not	Probably not	Definitely not
Cost	❍	❍	❍	❍	❍
Identity	❍	❍	❍	❍	❍
Community	❍	❍	❍	❍	❍
Culture	❍	❍	❍	❍	❍
Social	❍	❍	❍	❍	❍
Family size	❍	❍	❍	❍	❍

Q8.19
How important do you think the old customs are in relation to modern housing?

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Old customs	❍	❍	❍	❍	❍

Homeowner Questions about Urban Drift

Q9.1
If given a choice would you move to a city like Port Moresby or Lae or another large center?

	Extremely likely	Somewhat likely	Neither likely nor unlikely	Somewhat unlikely	Extremely unlikely
Port Moresby	❍	❍	❍	❍	❍
Lae	❍	❍	❍	❍	❍
Mt Hagen	❍	❍	❍	❍	❍
Madang	❍	❍	❍	❍	❍
Goroka	❍	❍	❍	❍	❍
Rabaul	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Answer If given a choice would you move to a city like Port Moresby or Lae? Extremely likely Is Selected and If given a choice would you move to a city like Port Moresby or Lae? Somewhat likely Is Selected

Q9.2
What are the reasons that you would move to the city? Please rank **at least 4** in order of importance by numbering the boxes.

- _____ Work
- _____ Family
- _____ Education
- _____ Social life
- _____ Better opportunities
- _____ Financial reasons
- _____ Health reasons
- _____ Friends
- _____ Environment
- _____ Other

Answer If given a choice would you move to a city like Port Moresby or Lae? Yes Is Selected

Q9.3
What type of home would you have in the city?

	Size	Location	Lifestyle	Cost
Modern	❑	❑	❑	❑
Same as village	❑	❑	❑	❑
Government provided	❑	❑	❑	❑
Shared	❑	❑	❑	❑
Employer provided	❑	❑	❑	❑
Informal Settlement	❑	❑	❑	❑
Other	❑	❑	❑	❑

Answer If given a choice would you move to a city like Port Moresby or Lae? Yes, Is Selected

Q9.4
What area of the city would you move to initially and why? This information will allow us to understand whether people who move to the city settle in certain areas and why they choose this location over others.

Q10.16

What are the barriers to housing availability or facilities in this area in your opinion? Please select all that apply.

- ❑ Economic (For example employment opportunities, cost of living)
- ❑ Social (For example, household composition, kinship, educational opportunities)
- ❑ Environmental
- ❑ Political
- ❑ Regulatory (For example, Government planning and development requirements)
- ❑ Land access (For example, customary, freehold, land disputes)
- ❑ Infrastructure (For example, roads, water, power, sanitation)
- ❑ Transport

Q10.17

What do you think prevents the problem from being solved now?

Q10.18

Of all the factors that we have talked about, which ones is it most important to tackle first?

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Appendix E

Tok Pisin Demographic Survey

Survey – JCU NCP Date: _____ Name of Interviewer: _____

E orait long mi askim yu sampela question?

Em i orait sapos yu les long bekim ol question bilong mi.

Name of Respondent:

Man Meri (circle gender of respondent)

Yu gat hamaspela Christmas? (Age)

Nem bilong tribe na haus man (tribe and lineage)

Yu save go long wanem lotu? (What church do you go to?)

Wanem wok bilong yu? (Do you have paid employment?)

Wanem tok ples yupela save tok tok? (What is the language spoken in this house?)

Wanem narapela tok ples yupela save tok tok?

Yu marit or nogat?

(If it is a man) Yu gat hamaspela meri?

(If it is a woman) Man bilong yu gat hamaspela meri?

Name bilong meri/man bilong yu husait?

Hamaspela manmeri/lain save stap long dispela haus? (How many people live in this house?)

Name bilong em?						
Relationship to respondent (W, H, Z, B, S, D, M, F, MM, FM, FF, FM, DS, DD, ZS, ZD)						
Em gat hamaspela Xmas?						
Wanem kain skul em save/bin go?						
Em save kisim moni olsem wanem?						

Yu gat sampela pikinini husait I no save stap wantaim yu long dispela haus? (Do you have any other children who do not live with you presently in this house?)

(If so where do they live?) Ems tap we?

Yu gat papa na mama?

Papa na mama bilong yu save stap we?

Yu gat Tumbuna?

Tumbuna bilong yu save stap we?

Husait save lukautim papa na mama, na Tumbuna bilong yu?

Yu gat sampela pik (do you keep pigs)? _____ Hamaspela pik (how many pigs)? _____

Yu gat sampela narpela animals?___kakaruk (chicken) ___, muruk (cassowary)___, kau (cow)___, sip (sheep)___, me me (goat)___, kapul (cuscus)___

Wanem kain gaten kai kai yu save planim long gaten? (What kinds of vegetables do you grow?)

Yu save salim ol kai kai bilong gaten (Do you sell any of your garden produce)?

(If yes) Wanem kai kai bilong gaten yu save salim (What garden produce do you grow for sale)?

Hamas plea taim yu save kisim long wokabout long haus bilong yu, i go long:

- Skul?_____
- Klinik / haussik?_____
- Wokples bilong yu?_____

Yu gat sampela moa tok tok long tokim mi?

Observations: (circle)

Roof type:		Tin	Thatch
Wall type:	Wood	Woven	Tin
	Other_____		
Stilts or ground:		Stilts	Ground
Water tank:		Yes	No
Taps:		Yes	No
Electricity:		Yes	No
Toilet:		Outhouse	Inside

Sketch of house and house complex (eg men's house, fun house, pig house, cook house, toilet):

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Appendix F

Fieldwork Observation Guide

OBSERVATION GUIDE

Participant ID No.	Gender: Ⓜ Ⓕ	Researcher Initials:
Region: Ⓗ Ⓒ Ⓡ Ⓘs	Social Region: Ⓥ Ⓤ Ⓘ Ⓢ	Date:
Address:		

** Social Regions: V = Village | U = Urban | I = Informal | S = Squatter

** Geographic Regions: H = Highlands | C = Coastal | R = Riverine | Is = Island

Purpose of Field Observation

Field observation has been found to be valuable in revealing insights that may be hard for implementers and recipients of interventions to articulate or pinpoint due to their familiarity with their daily practice, and in showing how these activities are played out in social and wider contexts. The intention is to observe the construction of a house, including questions regarding initial planning, material purchasing, site selection and rationale.

One interesting aspect as I reflect on this research is that architects draw plans and diagrams (representation, drawing to make an image) while builders usually build but don't necessarily design or plan. That maybe a western view, but how does the process work in PNG villages and informal settlements? Therefore, the intention here is to deconstruct the process as well as the outcomes (house and its parts). What is the equivalent of a drawing if they don't have plans? Where are the boundaries if they don't have surveys? Is there a respected craftsperson with local knowledge to whom they refer, and how is the process initiated?

Participants

Members of the study team will spend time observing and taking notes to describe activities, interactions and discourses. It will also involve informal discussions with implementers and those in proximity to the construction. Although the likely participants to be observed can be identified in advance, there may be others who are important to include as the study progresses but who are not anticipated *a priori* to be part of the implementation of the construction. In other words, there could be serendipitous input from interested parties in the community.

Observation Procedures

Observation will involve qualitative study, following the activities of those implementing and interacting with construction activities. The researcher will attempt to capture in field notes a detailed description of activities relating to construction, how these are explained and interpreted by different villagers, how different physical objects and concepts are used, referred to and employed to enact construction in practice.

The researcher will principally be observing activities and interactions but will also ask questions for clarification and will ask different villagers about their practices, seeking to bring to light logics, concerns, processes and meanings that emerge from the construction activities.

Recording Observations

Discussions and informal interviews will be recorded manually in field notes, or, if an informant is likely to provide more detailed information and partake in a lengthy discussion, the researcher will ask to digitally record the interview for later transcription. From these observations, the researcher will attempt to produce a thick description of the intervention activities in the physical and social spaces that they employ (Geertz, 1973).

The observation guide will be used to record data in a systematic format, including verbal and physical communications and transactions with clients and unstructured field notes to reflect on the relationship between those observed as well as the role of the researcher.

File Names

Each interview will be allocated a unique identifying number. This will be written on the interview form and in notes taken and will be used to name audio files and transcript documents. The format for naming files is as follow, e.g. POI_FR_H_04.

Type of data collection	Gender of respondent/group	Type of respondent/group	District	Number of interviews
IDI (In Depth Interview)	M F	R = researcher K = key informant S = stakeholder V = village leader	H = Highlands C = Coastal R = Riverine Is = Island	01-25
POI (Participant Observation Interview)	M F	R = researcher K = key informant S = stakeholder V = village leader	H = Highlands C = Coastal R = Riverine Is = Island	01-100

At the End of the Session

Is there anything you think is important about the building that we have not looked at or talked about?

- ✓ Thank participant
- ✓ Prepare for following day

Communication through Drawing

Plans

Represent the domain of action; information about people's activities which are manifestations of their values. The buildings that house them are embodiments of these values (Rapoport, 1969). Values are customs and conventions that are the habitual, and accepted, way of doing things.

Note the negative spaces between buildings. These are equally important in terms of spatial arrangement.

Aspects of the Site

Part of the wider environment extending beyond its boundaries, the site has a surface with a variety of features both of constraint and opportunity.

1. Location (map reference)

2. Access
3. Services (water, sewer, power)
4. Climate / Microclimate
5. Aspect (orientation of building to site)
6. Prospect (the opportunities for outlook and view)
7. Character (landforms, vegetation, smells, sound)

Humanistic View of Architecture

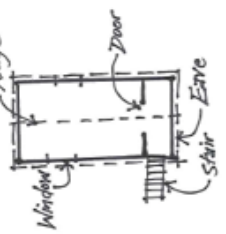
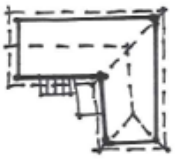
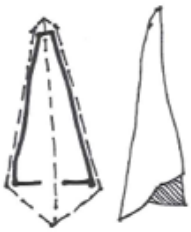
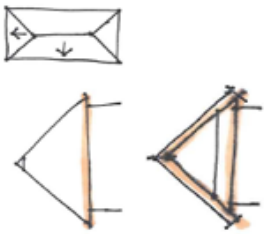
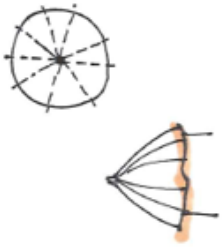
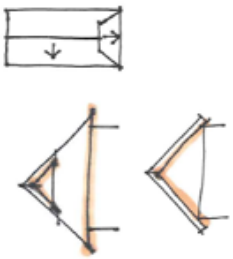
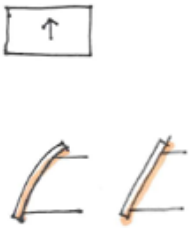
The architect is a facilitator of people's aspirations toward more humane buildings and cities. There is no one right way or one right answer. Constraints arise from the demands of different peoples' values, not all of which are equally important or strongly held, either by individuals or the social group. Parts of the building that are 'identified' as important are high on the value scale and therefore add to the salience of the building.

Vignettes

These are simple sequential sketches. Every sketch should have the artist's name, the date, location and any notes or thoughts.

1. Frame your view
2. Lightly rough in major components

House Typology (**Indicative only – sketch as necessary if exact match is not indicated below)

Element	Sketch					Image/Recording No.
Plan Indicative types and detail level for reference	Rectangular 	Round 	L-Shape 	Long House 	End Shape (specify)	
Roof Indicative types and detail level for reference	Hip 	Conical 	Gable / Dutch Gable 	Skillion 	Bowed / Tilted / Other 	
Wall Material Sketch details (eg horizontal or vertical boarding) for reference	Woven	Timber clad	Metal clad	Fibro Sheet	Other (describe)	
Roof Material Tick box	Leaf Thatch	Grass Thatch	Sheet Metal	Composite	Other (describe)	
Style Tick box	Highset on Stumps	Lowset on Stumps	On Ground	On Slab	Other	
Facilities Tick boxes	Electricity	Running Water	WC Inside/Outside (distance _____)	Cooking	Garden	

Appendix G

Fieldwork Program 2016 / 2017

Date	Activities (including daily Tok Pisin Class and write up of Field Notes)
21.09.2016	Introductions and Cultural Awareness Session led by Bernadine Danomira. Group discussion on approaches to ethnography and on the ethics of research in the PNG context led by Rosita Henry
22.09.2016	Meeting with mentors and exploratory village walk/initial observations. Fieldwork: Cleared land, levelled and compacted, for Haus Man Debrief and discussion on Writing Field Notes and Field Diaries How to write good field notes.
23.09.2016	Fieldwork with Cultural Mentors: Shaped and fixed posts and rafters, wove and wrapped blind. Discussion on audio-visual research methods, ethical dilemmas in audio-visual research. After Dinner Fireside Debrief and Documentary Film Screening: First Contact.
24.09.2016	Fieldwork with Cultural Mentors: Ceremonial costumes, dancing and drumming Group work on survey questions and survey design After Dinner Fireside Debrief and Documentary Film Screening: Joe Leahy's Neighbours.
25.09.2016	Church with mentors Workshop on drawing, drafting and mapping for ethnographers led by Rosemarie Rusch After Dinner Debrief
26.09.2016	Fieldwork: Cutting and carrying kunai grass for roof thatching Workshop on how to conduct an ethnographic interview led by Rosita Henry Bushwalk with mentor to see source and type of building materials After Dinner Debrief and Documentary Film: Black Harvest.
27.09.2016	Fieldwork: Village stay in traditional house overnight cultural experience Weaving tools and methods demonstration by mentor After Dinner Debrief and writing survey interview questions in Tok Pisin.
28.09.2016	Fieldwork: Village stay Mapping Drone survey with Richard Stegman and Nori Kupal. Bilum making class with village ladies After Dinner Debrief
29.09.2016	Fieldwork: Conduct survey. Roof thatching After Dinner Debrief, and traditional music
30.09.2016	Fieldwork: Completed roof thatching Workshop on Analysing and Interpreting Field Data Collating raw data (interviews, maps, notes, survey, and photos); and plan ethnographic writing After Dinner Fireside Debrief and fieldnote discussion
01.10.2016	Fieldwork: Haus completion and Smoking Ceremony Preparation of Farewell Feast Evening program: Student talks (8-10 minutes each) on research to cultural mentors and other guests from the village. Student play in Tok Pisin performed for mentors in Kunguma village Thank you and Farewell speeches.
02.10.2016	Depart Kunguma. Travel to Tubusereia
03.10.2016	Introductions and Cultural Familiarisation led by Igo Gari Meeting with mentors and exploratory village walk/initial observations Debrief and discussion on different interview approach between Kunguma and Tubusereia
04.10.2016	Refined and pared down research questions to suit focus group interviews Debrief, discussion, write up Field Notes
05.10.2016	Fieldwork: Focus Group Interview with residents in stilt houses over the sea Fieldwork: Individual Semi-Structured Interviews Collating raw data (interviews, maps, notes, survey, and photos)
06.10.2016	Fieldwork: Interviewed Traditional Builders, Roy Hanua and David Mahuta Fieldwork: Individual Semi-Structured Interviews Debrief, discussion, write up Field Notes

07.10.2016	Return to Australia

Date	Activities (including daily write up of Field Notes)
04.09.2017	Australian High Commission welcome and briefing in Port Moresby Boat to Motupore Island. Welcome, Introductions and Cultural History of Motupore island led by Dr Linus Digim'Rina, Dr Matthew Leavesley. Exploratory Motupore island walk/initial observations.
05.09.2017	Group discussion on the ethics, protocols and practice of research in the PNG context led by Dr Linus Digim'Rina, Dr Matthew Leavesley. Boat to Tubusereia for talks with Felix Daroa and familiarisation with village.
06.09.2017	Lecture by Professor Borut Telban Head of Anthropology Department at the Institute of Anthropological and Spatial Studies, Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU) regarding his 25 years of fieldwork experience in PNG. Visit to Motupore archaeological site.
07.09.2017	Flight to Mt Hagen Introduction to Kunguma Haus Poroman Facilitators, Cultural Workshop, explanation of the programme and tour of construction project led by Bernadine Danomira. Tok Pisin Class. After Dinner Debrief.
08.09.2017	Meeting with Village Councillors and Mentors. Fieldwork: Construction of outhouse – digging the pit. Workshop on drawing, drafting and mapping for ethnographers led by Rosemarie Rusch Tok Pisin Class. After Dinner Fireside Debrief and Documentary Film Screening: First Contact.
09.09.2017	Fieldwork: Bride Price Ceremony at Knep. (2 hours walk each way; full day cultural immersion) After Dinner Debrief
10.09.2017	Fieldwork: Church Service with Mentors Informal interviews regarding church building. Review of aerial maps, ILG survey and drone photos with Councillors Peter Raim and John Kawa After Dinner Debrief.
11.09.2017	Fieldwork Project: Bilum Making Review of 2016 survey 'gaps' with Thomas Las After Dinner Debrief and Documentary Film
12.09.2017	Walked to Peter Raim's village for comparative look at a second WHP village.
13.09.2017	Return to Gold Coast

Appendix H

Consent Forms and Procedures

STUDY TITLE	**WOVEN WALLS THREADED HORIZONS: Traditional Architecture in the Modern Urban Fabric of Papua New Guinea**
BOND UNIVERSITY ETHICS No.	**0000015370**

- The study has been explained to me in a language that I understand. All the questions I had about the study have been answered. I understand what will happen during the interview and what is expected of me.
- I have been informed that it is my right to refuse to take part in the interview and that if I choose to refuse, I do not have to give a reason.
- I have been informed that anything I say during the interview today will remain completely confidential: my name will not be used, nor any other information that could be used to identify me.
- It has been explained that sometimes the researchers find it helpful to use my own words when writing up the findings of this research. I understand that any use of my words would be completely anonymous (without my name). I have been told that I can decide whether I permit my words to be used in this way.

I agree to take part in the study	Yes	No
I agree that my own words may be used anonymously in the report	Yes	No
I agree to be audio recorded	Yes	No
I agree to be included in photographs	Yes	No

Signature of participant:

NAME (in capital letters)	**SIGNATURE OR THUMB PRINT**	**DATE OF SIGNATURE** (in DD/MM/YYYY)

If a thumb print is provided, signature of witness:

NAME (in capital letters)	**SIGNATURE**	**DATE OF SIGNATURE** (in DD/MM/YYYY)

Tick box if participant refuses to have witness present ☐

Signature of study staff taking consent:

I have discussed the study with the respondent named above, in a language he/she can comprehend.
I believe he/she has understood my explanation and agrees to take part in the interview.

NAME (in capital letters)	**SIGNATURE**	**DATE OF SIGNATURE** (in DD/MM/YYYY)

Faculty of Society and Design
Abedian School of Architecture
University Drive, Robina
Gold Coast, Queensland, 4229
Australia

STUDY TITLE	**WOVEN WALLS THREADED HORIZONS: Traditional Architecture in the Modern Urban Fabric of Papua New Guinea**
BOND UNIVERSITY ETHICS No.	**0000015370**

My name is **Rosemarie Rusch** and I am currently completing a **PhD in Sustainable Development** at **Bond University** under the supervision of **Professor Marja Sarvimaki**.

I am conducting a research investigation into traditional architecture in Papua New Guinea (PNG). I am specifically interested in the architecture of the people in villages and settlements in recent times.

As part of this study, I will invite you to participate in interviews about the planning and construction of village buildings that are not provided by government or aid agencies.

Participation in this study is completely voluntary and you may withdraw at any time without risking any negative consequences. If you choose to withdraw from participation in this study, the information you have provided will be immediately destroyed. All the data collected in this study will be treated with complete confidentiality and not made accessible to any person other than the researcher team working on this project. The information I obtain from you will be dealt with in a manner that ensures you remain anonymous.

It is anticipated that the data collected during this study will assist us in understanding what contemporary PNG housing is being built by villagers on customary land and informal settlements. Your participation in this study will enhance work towards affordable housing for PNG people. If you experience distress from participation in this research, please contact

Key Informant: _____

We thank you for taking time to assist us with this research. Date: _____

Should you have any complaints concerning the manner in which this research is being conducted please make contact with:

Bond University Human Research Ethics Committee, Bond University Office of Research Services.
Bond University, Gold Coast, 4229, Australia
Tel: +61 7 5595 4194 Fax: +61 7 5595 1120 email: ethics@bond.edu.au

INTERVIEW TOPIC GUIDE

Participant ID No.	Gender: Ⓜ Ⓕ	Researcher Initials:
Participant Type: Ⓡ Ⓚ Ⓢ Ⓥ	District:	Date:

Introduction

I am _____ from Bond University

- ✓ General purpose of the study
- ✓ Aims of the interview and expected duration
- ✓ Who is involved in the process (other participants)
- ✓ Why the participant's cooperation is important
- ✓ What will happen with the collected information and how the participant/target group will benefit
- ✓ Any questions?
- ✓ Consent

Warm up [demographic]
Can I ask some details about you?

Question	**Information on Participant**
Name	
House No./Location	
Level of Education	
No. persons living in house	
No. adults/gender/ages	
No. Children/gender/ages	

RELEASE FORM

I, (name) _____, hereby give my permission to Rosemarie Rusch (of Bond University) to identify me by name and to use any photograph or video footage taken of me on (date of interview) _____, for the purposes of:

YES	NO	[please tick]
☐	☐	Inclusion in a publication (a paper to be published in an Online Journal)
☐	☐	Inclusion in a PhD Thesis made not for profit but only for educational purposes and screening at film festivals.
☐	☐	Media/public relations (eg. Media releases, newspaper features, university student presentations)

By signing this form, I agree that an electronic and/or hard copy photographic image and footage of myself is collected and stored by Bond University for the purposes approved above.

I acknowledge that the information I have provided may be used to maintain contact with me. However, my details will not be passed on to any third party.

I am of full age, and I have read and understood the terms of this release.

Signature of participant: _____

Date: _____

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Appendix I

Five Little Pigs

Participants: JCU New Colombo Plan students

(Jack Growden, Paul Bowell, Rowena Bullio, Sophie Byrne, O'Keefe Bryan Eason, Samantha Harbort, Mallory Notting, Melisa Scalon, Mark Sulovski and Chloe Thomason).
Date of Recording: 01.10.2016 Rough Incomplete Pidgin Transcript:

Deep in the jungle, two pigs rear their children through the seasons in safety. But now time has changed, and the pig parents talk

Tupela tok	Two talk
Yupela go na mekim haus man Nau faifpela liklik pik ol ino save laik long wok Wanpela lik pik em I go long Baisu Em i wokim haus bilong em long Port Moresby Narapela tupela pik I stap bek long Hagen taun Narapela tupela pik I save stap long Kunguma	You fellows go and make a men' house Now the five little pigs didn't like working One little pig went to Baisu (Port Moresby) He made his house in Port Moresby City Another two pigs stayed in Hagen Town Another two pigs resided in Kunguma
Tupela bikpela muruk ol I go long haus bilong lik pik Jack Tupela muruk i bagarapim haus bilong jack	Two giant cassowaries went to the house belonging to little pig Jack The two cassowaries wrecked his house.

(Action) Terrified by the giant cassowaries, the first pig trotted to Hagen town in hope of safety.

Wanpela lik pik bilong Port Moresby (Jack)	**One little pig from Port Moresby (Jack)**
Mi ron hariap go long Hagen taun Mi bai go silip long haus bilong tupela barata bilong mi Tupela lik pik ol I silip long haus lo Hagen	I ran fast to Hagen Town I'll go and sleep at the house of my two brothers Two little pigs were sleeping in the Hagen house
Tupela bikpela muruk I go long haus bilong tripela lik pik long Hagen townTupela muruk I bagarapim haus.Tripela lik pik olgeta I ron go long Kunguma	Two giant cassowaries went to the house belonging to the three little pigs in Hagen town *The two cassowaries wrecked the house.* *Three little pigs all ran to Kunguma*
Peles Baisu inonap long haitim ol liklik pik moa na wokim ol singaut na ronowei go antap lo mauntain inap ol i painim ol narapela pik I silip wantaim long Kunguma	Baisu (Hagen) town couldn't hide the piglets either, so they squealed away, up the hills, until they found the other pigs nestled in Kunguma
Faifpela lik pik I mekim strongpela haus man long Kunguma. Tupela muruk ol I sot win long traim lo go insait long hausman, tasol ol inonap lo brukim strongpela haus man	The five little pigs made a strong Hausman in Kunguma. The two cassowaries exhausted themselves trying to break in, but couldn't break the strong Haus Man

The moral of the story is that 5 men, together, make a strong Hausman.
Thank you for involving us in the building of a Haus Man.
The End

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Appendix J

Fieldwork Demographic Data

ID	REGION	VILLAGE	TRIBE	GENDER	AGE RANGE	EDUCATION	EMPLOYMENT	INCOME PW	TYPE	Wall Material	Roof Material	WC	Water	Washing	Cooking	Waste	POWER
IDI-FM-H-06	Highlands	Emgna	Kopi	F	35-54	2	Housekeeper	101-200	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-03	Highlands	Gatek	Kopi	M	35-54	1	Security Guard	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-04	Highlands	Gatek	Kopi	M	35-54	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-09	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-12	Highlands	Gatek	Kopi	M	>=65	1	Factory hand	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
IDI-FM-H-02	Highlands	Gatek	Kopi	F	26-34	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-18	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-20	Highlands	Gatek	Kopi	M	35-54	2	Carpenter	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-21	Highlands	Gatek	Kopi	M	26-34	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Outside	Pit	None
POI-MS-H-22	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-23	Highlands	Gatek	Kopi	M	55-64	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-25	Highlands	Gatek	Kopi	F	35-54	4	Nurse	201-300	Ground	Sheet metal	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
IDI-MM-H-15	Highlands	Gatek	Kopi	M	26-34	5	SF	<=100	Ground	Sheet metal	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-27	Highlands	Gatek	Kopi	M	55-64	4	Inspector	301-400	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-29	Highlands	Gatek	Kopi	M	35-54	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-31	Highlands	Gatek	Kopi	M	35-54	1	SF	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-34	Highlands	Gatek	Kopi	M	26-34	5	Electrician	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-36	Highlands	Gatek	Kopi	M	55-64	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-39	Highlands	Gatek	Kopi	M	55-64	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-40	Highlands	Gatek	Kopi	F	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-07	Highlands	Gatek	Kopi	M	35-54	3	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-42	Highlands	Gatek	Kopi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-44	Highlands	Gatek	Kopi	M	>=65	5	Mechanic	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-43	Highlands	Gatek	Kopi	M	26-34	3	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
7POI-MS-H-46	Highlands	Gatek	Kopi	M	55-64	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-50	Highlands	Gatek	Kopi	M	55-64	1	Traditional Doctor	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-52	Highlands	Gatek	Kopi	M	>=65	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-53	Highlands	Gatek	Kopi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-54	Highlands	Gatek	Kopi	M	55-64	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-55	Highlands	Gatek	Kopi	F	18-25	4	Nursing Student	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-59	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Sheet metal	N	Tap	Creek	Haus Kuk	Pit	Power
POI-MS-H-58	Highlands	Gatek	Kopi	M	18-25	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-61	Highlands	Gatek	Kopi	M	35-54	2	Carpenter	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-62	Highlands	Gatek	Kopi	M	35-54	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-63	Highlands	Gatek	Kopi	F	26-34	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-64	Highlands	Gatek	Kopi	M	35-54	2	Carpenter	201-300	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
IDI-MM-H-04	Highlands	Gatek	Kopi	M	35-54	3	Kopi Councillor	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-67	Highlands	Gatek	Kopi	M	35-54	3	Security Guard	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
IDI-MV-H-05	Highlands	Gatek	Kopi	M	35-54	2	Security Guard	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-68	Highlands	Gatek	Kopi	M	55-64	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-70	Highlands	Gatek	Kopi	M	55-64	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-71	Highlands	Gatek	Kopi	M	26-34	4	Deputy Principal	401-500	Ground	Woven	Sheet metal	N	Tap	Creek	Haus Kuk	Pit	Power
POI-MS-H-72	Highlands	Gatek	Kopi	F	55-64	3	Retail	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-73	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-74	Highlands	Gatek	Kopi	F	>=65	1	SF	<=100	Ground	Woven	Sheet metal	N	None	Drum	Outside	Pit	None
POI-MS-H-77	Highlands	Gatek	Kopi	F	26-34	3	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-79	Highlands	Gatek	Kopi	F	26-34	2	SF	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-84	Highlands	Gatek	Kopi	M	35-54	3	Storeman	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-83	Highlands	Gatek	Kopi	M	35-54	2	Security Guard	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-86	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-88	Highlands	Gatek	Penambi	M	35-54	3	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-87	Highlands	Gatek	Kopi	M	35-54	4	Teacher	401-500	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-89	Highlands	Gatek	Kopi	M	35-54	3	Chef	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-90	Highlands	Gatek	Kopi	M	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-91	Highlands	Gatek	Kopi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-28	Highlands	Kingerp	Penambi	M	35-54	1	Pastor	<=100	Stills / Ground	Woven	Kunai	N	None	Creek	Outside	Pit	None
IDI-FM-H-05	Highlands	Kingerp	Jiga	F	26-34	1	SF	<=100	Ground / Stilts	Timber	Sheet metal	N	None	Creek	Outside	Pit	None
POI-MS-H-49	Highlands	Kingerp	Penambi	M	>=65	1	SF	<=100	Ground	Sheet metal	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-51	Highlands	Kingerp	Tona	F	35-54	1	SF	<=100	Stilts	Woven	Sheet metal	N	Drum	Creek	Outside	Pit	None
IDI-MV-H-03	Highlands	Kingerp	Penambi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	Tank	Creek	Haus Kuk	Pit	None
POI-MS-H-76	Highlands	Kingerp	Ulga	F	55-64	1	SF	<=100	Ground	Timber	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-80	Highlands	Kingerp	Penambi	M	>=65	3	SF	<=100	Stills / Ground	Timber	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-16	Highlands	Kingerp	Penambi	M	35-54	4	Employed	<=100	Ground	Timber	Sheet metal	N	Tank	Creek	Haus Kuk	Pit	None
IDI-MM-H-13	Highlands	Kopi	Kopi	M	26-34	4	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-02	Highlands	Kunguma	Penambi	M	35-54	1	Buai Trade	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
IDI-FM-H-01	Highlands	Kunguma	Penambi	F	26-34	2	Employed	<=100	Ground	Sheet metal	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
IDI-FK-H-02	Highlands	Kunguma	Penambi	F	35-54	3	Lodge Manager	101-200	Ground	Woven	Sheet metal	Y	Tank	Inside	Inside	Pit	Power
POI-FS-H-05	Highlands	Kunguma	Penambi	F	18-25	6	Clerk	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
IDI-FK-H-01	Highlands	Kunguma	Penambi	F	35-54	6	Lodge Manager	101-200	Ground	Woven	Sheet metal	Y	Tap	Inside	Inside	Pit	Power
POI-MS-H-06	Highlands	Kunguma	Penambi	M	55-64	1	Pastor	101-200	Ground	Woven	Sheet metal	N	Tap	Creek	Inside	Pit	Power
POI-MS-H-07	Highlands	Kunguma	Penambi	M	35-54	1	Pastor	101-200	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
POI-FS-H-08	Highlands	Kunguma	Penambi	F	26-34	5	Bookeeper	201-300	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-10	Highlands	Kunguma	Penambi	M	35-54	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-11	Highlands	Kunguma	Penambi	M	35-54	2	Carpenter	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
POI-FS-H-13	Highlands	Kunguma	Kopi	F	35-54	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-FS-H-14	Highlands	Kunguma	Penambi	F	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-15	Highlands	Kunguma	Penambi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-16	Highlands	Kunguma	Penambi	M	26-34	5	Hospitality	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Solar
POI-MS-H-17	Highlands	Kunguma	Penambi	M	26-34	5	Chef	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
IDI-FM-H-03	Highlands	Kunguma	Penambi	F	35-54	4	Chef	201-300	Ground	Woven	Sheet metal	N	Drum	Pond	Haus Kuk	Pit	Power

NOTES

EDUCATION SCALE

SUBSISTENCE (LITTLE OR NO)	1
PRIMARY	2
HIGH SCHOOL	3
VOCATIONAL	4
TRADE	5
UNIVERSITY	6

Researcher	R
Key informant	K
Stakeholder	S
Village leader	V
Mentor	M

POI-MS-H-19	Highlands	Kunguma	Penambi	M	55-64	3	Clerk	201-300	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-24	Highlands	Kunguma	Penambi	M	55-64	2	Cargo Driver	201-300	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-FM-H-04	Highlands	Kunguma	Penambi	F	35-54	1	SF	<=100	Ground	Sheet metal	Sheet metal	N	None	Drum	Haus Kuk	Pit	Power
POI-MS-H-26	Highlands	Kunguma	Penambi	F	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
IDI-MV-H-01	Highlands	Kunguma	Penambi	M	>=65	1	Penambi Councillor	<=100	Ground	Sheet metal	Sheet metal	N	Drum	Creek	Outside	Pit	None
POI-MS-H-30	Highlands	Kunguma	Penambi	M	26-34	3	Assistant Surveyor	201-300		Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MV-H-02	Highlands	Kunguma	Penambi	M	55-64	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-32	Highlands	Kunguma	Penambi	M	>=65	3	Trader	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-33	Highlands	Kunguma	Penambi	M	35-54	3	Ticketing Officer	301-400	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-35	Highlands	Kunguma	Moki	F	>=65	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-37	Highlands	Kunguma	Penambi	M	26-34	3	Buai Trade	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-38	Highlands	Kunguma	Penambi	M	18-25	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-41	Highlands	Kunguma	Penambi	M	26-34	3	Tradesman	301-400	Ground	Woven	Kunai	N	Tap	Creek	Haus Kuk	Pit	Power
IDI-FM-H-08	Highlands	Kunguma	Kawipna SHP	F	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-45	Highlands	Kunguma	Penambi	M	35-54	4	Teacher	301-400	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-46	Highlands	Kunguma	Penambi	M	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-15	Highlands	Kunguma	Penambi	M	35-54	1	Groundsman	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-48	Highlands	Kunguma	Penambi	M	55-64	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-10	Highlands	Kunguma	Penambi	M	35-54	1	Trader	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-56	Highlands	Kunguma	Penambi	M	26-34	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-11	Highlands	Kunguma	Penambi	M	26-34	3	SF	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-57	Highlands	Kunguma	Penambi	M	35-54	3	SF	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-60	Highlands	Kunguma	Penambi	M	35-54	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-65	Highlands	Kunguma	Penambi	M	35-54	2	Carpenter	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-66	Highlands	Kunguma	Penambi	M	35-54	1	Agriculture	<=100	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-69	Highlands	Kunguma	Penambi	M	55-64	1	Retail	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-75	Highlands	Kunguma	Penambi	F	35-54	4	Nurse	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-78	Highlands	Kunguma	Penambi	M	35-54	1	Chef	301-400	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-81	Highlands	Kunguma	Penambi	M	35-54	3	Restauranteur	301-400	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	Power
POI-MS-H-82	Highlands	Kunguma	Dei	F	35-54	2	SF	<=100	Ground	Woven	Kunai	N	None	Pond	Haus Kuk	Pit	Power
IDI-MM-H-15	Highlands	Kunguma	Penambi	M	26-34	4	Cook	<=100	Ground	Woven	Sheet metal	N	None	Creek	Outside	Pit	Power
IDI-MM-H-12	Highlands	Kunguma	Penambi	M	26-34	4	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Inside	Pit	Power
POI-MS-H-92	Highlands	Kunguma	Penambi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-14	Highlands	Kunguma	Penambi	M	55-64	5	SF	<=100	Stilts / Ground	Timber	Sheet metal	Y	Tank	Inside	Haus Kuk	Pit	Power
POI-MS-H-84	Highlands	Kunguma	Penambi	M	>=65	1	SF	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-H-85	Highlands	Kunguma	Penambi	M	55-64	5	Carpenter	201-300	Ground	Woven	Sheet metal	N	None	Creek	Haus Kuk	Pit	None
POI-FS-H-01	Highlands	Wanpaglama	Kopi	F	>=65	4	Housemaid	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
IDI-MM-H-09	Highlands	Wanpaglama	Penambi	M	35-54	1	Groundsman	<=100	Ground	Woven	Kunai	N	None	Creek	Haus Kuk	Pit	None
POI-MS-C-08	Coastal	Gabiruma	Motu	M	>=65	5	Employed	101-200	High Set_Land	Fibro	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
POI-MS-C-01	Coastal	Tubusereia	Motu	M	35-54	6	Auditor	>=500	High Set_Land	Fibro	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
IDI-MM-C-02	Coastal	Tubusereia	Motu	M	35-54	5	Painter	101-200	High Set_Land	Fibro	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
POI-MS-C-02	Coastal	Tubusereia	Motu	M	35-54	5	Unemployed	101-200	High Set_Land	Timber	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
POI-MS-C-03	Coastal	Tubusereia	Motu	M	35-54	2	Carpenter	201-300	Low Set_Land	Timber	Sheet metal	Y	Tank	Outside	Outside	Incinerator	None
POI-MS-C-04	Coastal	Tubusereia	Motu	M	26-34	6	Public Servant	301-400	High Set_Land	Timber	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
POI-MS-C-05	Coastal	Tubusereia	Motu	M	35-54	5	Artist	201-300	High Set_Land	Fibro	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
POI-MS-C-06	Coastal	Tubusereia	Motu	M	35-54	3	Unemployed	<=100	High Set_Land	Timber	Sheet metal	N	Tank	Outside	Outside	Incinerator	None
POI-MS-C-07	Coastal	Tubusereia	Motu	M	35-54	3	Clerk	201-300	High Set_Land	Timber	Sheet metal	N	Tank	Outside	Gas	Incinerator	Power
IDI-MM-C-01	Coastal	Tubusereia	Motu	M	>=65	5	Retired	<=100	High Set_Land	Fibro	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
IDI-MV-C-02	Coastal	Varure	Motubuna Laurina	M	55-64	4	Employed	201-300	High Set_Land	Fibro	Sheet metal	N	Tank	Outside	Outside	Incinerator	Power
IDI-FS-C-03	Coastal	Varure	Geabada	F	55-64	2	Housewife	<=100	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MS-C-04	Coastal	Varure	Abai	M	35-54	3	Unemployed	<=100	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MS-C-01	Coastal	Varure	Geabada	M	35-54	3	Employed	101-200	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MS-C-05	Coastal	Varure	Minihi	M	>=65	3	Retired	<=100	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MS-C-07	Coastal	Varure	Gunina	M	18-25	3	Unemployed	<=100	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MV-C-01	Coastal	Varure	Motubuna Laurina	M	>=65	5	Retired	<=100	High Set_Land	Fibro	Sheet metal	Y	Tank	Outside	Outside	Incinerator	Power
IDI-MV-C-03	Coastal	Varure	Motubuna Laurina	M	>=65	6	Retired	<=100	High Set_Land	Fibro	Sheet metal	N	Drum	Outside	Outside	Incinerator	Power
IDI-FS-C-02	Coastal	Varure	Kwaradubuna	F	>=65	2	Housewife	<=100	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MS-C-06	Coastal	Varure	Abai	M	55-64	3	Unemployed	<=100	High Set_Sea	Fibro	Sheet metal	N	Drum	Outside	Outside	Sea	None
IDI-MV-C-04	Coastal	Oroi	Nara	M	55-64	2	Subsistence	<=100									
IDI-MV-C-05	Coastal	Oroi	Nara	M	55-64	2	Subsistence	<=100									
IDI-MV-C-06	Coastal	Oroi	Nara	M	55-65	2	Subsistence	<=101									